CAPPING AND DREDGING CONSTRUCTION COMPLETION REPORT ONONDAGA LAKE

Prepared for

Honeywell

Prepared by

ANCHOR QEA

PARSONS

September 2017

518060

CERTIFICATIONS

We, Joseph A. Detor and Thomas C. Drachenberg, are currently registered professional engineers licensed by the State of New York, and had primary direct responsibility for implementation of the remedial program activities, and certify that the dredging and capping portions of the Onondaga Lake Capping, Dredging, and Habitat and Profundal Zone (Sediment Management Unit 8) Final Design was implemented and that all construction activities were completed in substantial conformance with the Department-approved Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (Sediment Management Unit 8) Final Design.

We certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

We certify that all information and statements in this certification form are true.
I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. We, Joseph A. Detor, of Anchor QEA, 290 Elwood Davis Road, Suite 340, Liverpool, New York 13088, and Thomas C. Drachenberg, of Parsons, 301 Plainfield Road, Suite 350, Syracuse, New York 13212, are certifying as Owner's Designated Site Representatives for the site.

61244	9/7/2017	
Joseph A. Detor NYS Professional Engineer No.	Date	Signature

86020	9/7/2017	
Thomas C. Drachenberg NYS Professional Engineer No.	Date	Signature

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LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	ASTM International
ATL	Atlantic Testing Laboratories
CCR	Construction Completion Report
CHASP	Community Health and Safety Plan
CMU	Cap Management Unit
CPP	Citizen Participation Plan
CQA	construction quality assurance
CQAP	*Construction Quality Assurance Plan*
CQC	construction quality control
cy	cubic yard
DMU	Dredge Management Unit
DSC	Dredging Supply Company, Inc.
ESD	Explanation of Significant Differences
FCF	Field Change Form
FDR	*Onondaga Lake Capping, Dredging, and Habitat and Profundal Zone (Sediment Management Unit 8) Final Design Report*
FS	Feasibility Study
GAC	granular activated carbon
HDPE	high-density polyethylene
Honeywell	Honeywell International Inc.
ILWD	in-lake waste deposit
IPC	inclined plate clarifier
LGAC	liquid phase granular activated carbon
Metro	Onondaga County Metropolitan Wastewater Treatment Plant
mg/kg	milligrams per kilogram
MGD	million gallons per day
MMF	multimedia filter
MPC	modified protective cap
NAPL	nonaqueous phase liquid

NAVD88	North American Vertical Datum of 1988
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
OBG	O'Brien and Gere Engineers
OCDWEP	Onondaga County Department of Water Environment Protection
OSHA	Occupational Safety and Health Administration
PRG	Preliminary Remedial Goal
PSHEP	Project Safety, Health, and Environmental Plan
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RA	Remediation Area
RAO	Remedial Action Objective
ROD	Record of Decision
RTK-GPS	Real-time Kinematic Global Positioning System
SCA	Sediment Consolidation Area
SCADA	supervisory control and data acquisition
Sevenson	Sevenson Environmental Services, Inc.
SMU	Sediment Management Unit
SOW	Statement of Work
SSP	Subcontractor Safety Plan
SVOC	semivolatile organic compound
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WBB/HB	Wastebed B/Harbor Brook
WEDA	Western Dredging Association
WQMMP	*Water Quality Management and Monitoring Plan*
WTP	water treatment plant
XRF	X-ray fluorescence

EXECUTIVE SUMMARY

This report summarizes remediation activities at Onondaga Lake that were conducted as described in the *Onondaga Lake Capping, Dredging, and Habitat and Profundal Zone Final Design Report* (FDR; Parsons and Anchor QEA 2012). These remediation activities were implemented in accordance with a Consent Decree (USDC 2007; No. 89-CV-815) with the New York State Department of Environmental Conservation (NYSDEC) for Onondaga Lake as outlined in the Record of Decision (ROD) issued on July 1, 2005. Onondaga Lake is a 4.6-square-mile (3,000-acre) lake located in Central New York State immediately northwest of the City of Syracuse. This report summarizes those components of the remedy pertaining to dredging and capping, including the following:

- Dredging of contaminated sediment/waste from the littoral zone in Sediment Management Units (SMUs) 1 through 7
- Dredging, as needed, of an additional 3.3 feet in the in-lake waste deposit (ILWD)
- Placement of an isolation cap in the littoral zone (SMUs 1 through 7)
- Placement of a thin-layer cap in select portions of the profundal zone (SMU 8)

Other components of the remedy not pertaining to dredging and capping will be described under separate cover. These other components include habitat restoration, oxygenation in SMU 8 for reduction of the formation of methylmercury, monitored natural attenuation in SMU 8, implementation of institutional controls, and implementation of a long-term operation, maintenance, and monitoring program.

Hydraulic dredging was the primary method for sediment removal, and performed using either a 14-inch or 16-inch dredge, one at a time. All hydraulically dredged materials were pumped within a double-walled dredge slurry pipeline to the Sediment Consolidation Area located on Honeywell-owned property in Camillus, New York, for dewatering and containment in geotextile tubes. Mechanical dredging was used on a limited basis for a portion of the Wastebed B/Harbor Brook (WBB/HB) Outboard Area adjacent to Remediation Area D. In total, approximately 2.15 million cubic yards (cy) of sediment were removed from the lake across 215 acres from July 2012 through October 2014. Dredging was completed one season ahead of the planned schedule.

From 2012 through 2016, approximately 3.1 million cy of cap material was placed across 475 acres as part of the remedy. Cap materials were placed either hydraulically using a custom hydraulic spreader barge (1.6 million cy) or mechanically (1.5 million cy); the placement method depended on the grain size of the cap material being placed, the water depth at the placement location, and the proximity to obstructions. As many as five separate capping operations were often at work simultaneously. The installed cap was designed for an effective life span of 1,000 years, and was constructed of varying types of single-layer and multi-layer caps using siderite, granular activated carbon (GAC), sands, gravels, and topsoil.

Both the dredging and the capping operations were subject to a robust construction quality control (CQC)/construction quality assurance (CQA) program designed to verify that the dredging and capping was completed in accordance with the Final Design and subsequent NYSDEC-approved modifications. Dredging areas were divided into Dredge Management Units (DMUs) and completion was verified within each DMU using single-beam dual-frequency bathymetric surveys. CQC bathymetric surveys were validated by performing duplicate CQA surveys across a minimum of 10% of each CQC survey area. The CQC/CQA program for the capping involved measurement of each individual cap layer in both single-layer and multi-layer caps. Layer thickness was verified using a variety of techniques including core sampling, catch pans, and survey data collection. Thermal processes were utilized to determine the presence of the necessary components for chemical isolation layers (siderite, GAC). Bathymetric survey data were collected across completed caps to verify the installed cap was completed within the elevation tolerances specified by the design. Similar to the dredging program, CQA measurements were collected for a minimum of 10% of the CQC measurements.

A rigorous and comprehensive health and safety program was developed and maintained throughout the duration of the remedy construction. More than 1.6 million hours were worked during the remedy, with safety metrics better than industry averages using metrics defined by the Occupational Health and Safety Administration (OSHA). The Total Recordable Injury Rate (the number of OSHA-recordable injuries per 200,000 hours worked) during the remedy construction was 0.74, which is an injury rate less than one-ninth of the comparable industry rate of 7.2. In addition, the OSHA Lost Time Injury Rate (the number of OSHA-recordable injuries resulting in lost time from work, per 200,000 hours worked) was 0.0, as compared to the industry rate of 2.7. This project was selected for the Western Dredging Association (WEDA) Safety Commission Award in 2014, in recognition of an outstanding safety record for a multi-party and complex site.

A water quality monitoring program was also developed and maintained throughout the duration of the remedy construction. Water quality monitoring included continuous turbidity monitoring at stationary locations located around the perimeter of work areas, limited monitoring at discrete locations with a handheld device, and discrete water column sampling for chemical analysis. Only three action level turbidity exceedances were recorded while monitoring dredging and capping activities, and investigations of those events determined that none were the result of the remedial construction activities. All analytical results for discrete water column samples collected at compliance monitoring locations outside the dredging operations were below applicable New York State Aquatic (Acute) Class B/C Surface Water Quality Standards.

The dredging and capping activities described in this report are part of an optimized, environmentally protective solution based on sound scientific and engineering principles, designed to achieve long-term habitat restoration and economic benefits to the lake.

1 INTRODUCTION

This *Onondaga Lake Capping and Dredging Construction Completion Report* (CCR) has been prepared on behalf of Honeywell International Inc. (Honeywell) and summarizes remediation activities at the lake that were conducted in accordance with the design detailed in the *Onondaga Lake Capping, Dredging, and Habitat and Profundal Zone (Sediment Management Unit 8) Final Design Report* (FDR; Parsons and Anchor QEA 2012), and in design addenda and revisions that were issued as new information became available during construction of the remedy. These addenda and revisions are described in greater detail in the sections below.

1.1 Project Background

Onondaga Lake is a 4.6-square-mile (3,000-acre) lake located in Central New York State immediately northwest of the City of Syracuse (Figure 1-1). The lake is approximately 4.5 miles long and 1 mile wide, with an average water depth of 36 feet.

Onondaga Lake and Environs

A legacy of industrialization and municipal development since the late nineteenth century resulted in impaired water quality and contamination of lake sediments. Contaminants of concern include mercury from a former chlor-alkali facility, multiple organic contaminants (volatile and semivolatile organic compounds [SVOCs] and polychlorinated biphenyls) from other chemical/manufacturing operations, and hyperalkaline (pH greater than 12) inorganic materials. The lake is part of the Onondaga Lake Site, which is on the New York State Registry of Inactive Hazardous Waste Sites and the U.S. Environmental Protection Agency's (USEPA's) National Priorities List of Superfund sites. Honeywell entered into a Consent Decree (USDC 2007; No. 89-CV-815) with the New York State Department of

Environmental Conservation (NYSDEC) to implement the selected remedy for Onondaga Lake as outlined in the Record of Decision (ROD) issued on July 1, 2005.

A comprehensive lake restoration plan was developed following two decades of intensive multi-disciplinary technical studies by some of North America's leading scientific, engineering, and research organizations. The restoration and design process involved close coordination and discussions with multiple regulatory agencies and extensive public participation, and was supported by several technical studies, including: 1) development of sediment and fish tissue remedial goals; 2) detailed evaluations of capping, dredging and upland containment, natural recovery, and nitrate addition to the lower part of the lake water column (to limit production of methylmercury); and 3) integration of habitat restoration into the lake-wide cleanup effort.

As part of the remedial alternative development and evaluation process during the Feasibility Study (FS; Parsons 2004), the lake bottom was divided into eight Sediment Management Units (SMUs) based on water depth, source of water entering the lake, and physical, ecological, and chemical characteristics (NYSDEC and USEPA 2005). SMUs 1 through 7 are in the littoral zone (less than 30 feet water depth) of the lake where most aquatic vegetation and aquatic life reside, and SMU 8 consists of sediment in the profundal zone (deeper than 30 feet; Figure 1-2).

To facilitate the design process, the littoral zone was re-divided into six distinct remediation areas (RAs), designated RA-A through RA-F (Figure 1-2), to replace SMUs 1 through 7. Thin-layer capping was also included in the remedy for select portions of the profundal zone (SMU 8). These remediation areas were established using data collected during the pre-design investigation, and collectively cover approximately 475 acres.

1.2 Report Organization

This report is organized into eight sections, summarized in the following, and multiple appendices:

- **Section 1: Introduction** – presents background information and site description
- **Section 2: Summary of Site Remedy** – summarizes the remedy presented in the ROD that was selected for the project site
- **Section 3: Project Management** – presents the plans generated to manage and control the work in a safe, effective, and environmentally responsible manner, and documents the roles and responsibilities of the contractors and consultants responsible for executing those plans
- **Section 4: Description of Remedial Actions – Dredging** – presents information related to the portion of the remedy related to dredging activities
- **Section 5: Description of Remedial Actions – Capping** – presents information related to the portion of the remedy related to capping activities and habitat construction, including material types, sequencing, and verification
- **Section 6: Water Quality Monitoring** – presents a summary of water quality monitoring data collected during the dredging and capping activities
- **Section 7: Summary** – presents a summary of this report
- **Section 8: References** – lists the references used to prepare this report

2 SUMMARY OF SITE REMEDY

The remedial activities described in this report were constructed as described in the FDR and in subsequent design addenda and revisions that were issued as construction of the remedy progressed. The FDR describes the components of the Onondaga Lake remediation including sediment dredging, sediment capping, and habitat restoration and enhancement. The associated design addenda and revisions are summarized in Sections 2.4.3 and 2.4.4, respectively, of this report.

2.1 Record of Decision

The ROD (NYSDEC and USEPA 2005) presents the remedy selected by NYSDEC and the USEPA for addressing the Remedial Action Objectives (RAOs) and Preliminary Remedial Goals (PRGs) for the lake bottom. A full listing of RAOs and PRGs can be found in the ROD (NYSDEC and USEPA 2005).

The Statement of Work (SOW), presented as Appendix C of the Consent Decree (USDC 2007), further describes design-related elements for the implementation of the remedy, including: the development of dredging areas and volume; isolation cap areas and components; an approach for addressing the profundal zone (SMU 8); management of dredged sediments; water treatment; and the overall project schedule.

2.2 Description of Selected Remedy

The site was remediated in accordance with the remedy selected by NYSDEC in the ROD, and the SOW dated January 4, 2007 (included as Appendix C of the Consent Decree). The factors considered during the selection of the remedy are those listed in six New York Codes, Rules, and Regulations (NYCRR) 375-1.8. The selected remedy is set forth in the ROD and SOW and is summarized as follows for the in-lake components of the remedy (USDC 2007; appendices to the Consent Decree):

- Dredging of as much as an estimated 2,653,000 cubic yards (cy) of contaminated sediment/waste from the littoral zone in SMUs 1 through 7 to a depth that will prevent the loss of lake surface area, ensure cap effectiveness, remove nonaqueous phase liquids (NAPLs), reduce contaminant mass, allow for erosion protection, and re-establish the littoral zone habitat; most of the dredging will be performed in the in-lake waste deposit (ILWD; which largely exists in SMU 1) and in SMU 2

- Dredging, as needed, of an additional 3.3 feet in the ILWD to remove materials within areas of hot spots (to improve cap effectiveness) and additional dredging, as needed, to ensure stability of the cap
- Placement of an isolation cap over an estimated 425 acres of SMUs 1 through 7
- Completion of a comprehensive Lakewide Habitat Restoration Plan
- Habitat reestablishment consistent with the Lakewide Habitat Restoration Plan in areas of dredging/capping
- Placement of a thin-layer cap over an estimated 154 acres of the profundal zone (SMU 8)
- A pilot study to evaluate the potential effectiveness of oxygenation at reducing the formation of methylmercury in the water column, while preserving the normal cycle of stratification within the lake – An additional factor that will be considered during the design of the pilot study will be the effectiveness of oxygenation at reducing fish tissue methylmercury concentrations. If supported by the pilot study results, the pilot study will be followed by full-scale implementation of oxygenation in SMU 8. Furthermore, potential impacts of oxygenation on the lake system will be evaluated during the pilot study and/or the remedial design of the full-scale oxygenation system. In addition, as discussed in the SOW, a study will be performed to determine if nitrification can effectively decrease formation of methylmercury in the water column while preserving the normal cycle of lake stratification. If NYSDEC determines from this study that nitrification is effective and appropriate, a nitrification program may be implemented in lieu of an oxygenation pilot study.
- Monitored natural recovery in SMU 8 to achieve the mercury probable effect concentration of 2.2 milligrams per kilogram (mg/kg or parts per million) in the lake's profundal zone (where water depths exceed 30 feet or 9 meters) and to achieve the bioaccumulation-based sediment quality value for mercury of 0.8 mg/kg on an area-wide basis, within 10 years following the remediation of upland sources, dredging and/or isolation capping of littoral sediment, and initial thin-layer capping in the profundal zone

- Implementation of institutional controls including the notification of appropriate governmental agencies with authority for permitting potential future activities that could impact the implementation and effectiveness of the remedy
- Implementation of a long-term operation, maintenance, and monitoring program to monitor and maintain the effectiveness of the remedy

NYSDEC and USEPA issued an Explanation of Significant Differences (ESD) as Appendix B of the Consent Decree to specify a modification to the selected remedy documented in the ROD. Based on investigation data and a stability evaluation, there was significantly less NAPL-impacted material beneath the lake in SMU 2 than was assumed during the FS and ROD, and removing this material could result in instability of the adjacent shoreline. Therefore, the alignment of the Willis/Semet Interim Remedial Measure barrier wall (Willis portion) was moved offshore immediately beyond the farthest extent of pooled NAPLs within the lake in lieu of dredging this material. NAPL recovery wells were installed on the landward side of the new barrier wall, and upland areas along Wastebeds 1 to 8 were converted to new aquatic habitat to mitigate the loss of lake surface area resulting from placement of the barrier wall offshore.

NYSDEC and USEPA also issued an ESD in August 2014 to become part of the Administrative Record related to the ROD. This ESD addressed establishment of a buffer zone along the southeast shoreline where no dredging or capping would occur as the best means to prevent shoreline and rail line instability, as discussed in more detail in Section 2.4.3.1 Remediation Area E Shoreline – August 2014. This ESD also identified nitrification of the hypolimnion by adding nitrate to the deep lake water as the alternative to oxygenation, based on the success of a 3-year nitrate addition pilot study that was conducted from 2011 through 2013. Based on the study's results, it was concluded that nitrate addition effectively inhibits the release of methylmercury from sediment in the water portions of the lake.

This CCR summarizes the dredging and capping portions of the remedy set forth in the ROD and SOW and modified by the ESDs (dredging in the littoral zone, dredging in the ILWD, placement of an isolation cap, placement of a thin-layer cap, creation of a buffer zone adjacent to rail lines, and utilization of nitrate addition as an alternative to oxygenation). The other portions of the remedy are described separately.

2.3 Adjacent Remediation Areas

In addition to the lake itself, three areas along the shoreline of the lake have been included as components of the Onondaga Lake remediation: 1) the spits at the mouth of Ninemile Creek; 2) the connected wetlands and shoreline stabilization at Wastebeds 1 to 8; and 3) the WBB/HB Outboard Area (Figure 2-1). Due to similarities in remedial designs and the connectivity with the adjacent lake, the remedial design for the lake also included portions of the designs for these three areas. The remediation of these areas occurred in conjunction with the remediation of the lake area, and the descriptions of dredging and capping included in Sections 4 and 5 apply to these adjacent remediation areas as well.

2.4 Governing Documents

The major documents prepared to manage the remedial activities, including provisions for health and safety, remedial design, quality assurance (QA) and quality control (QC), and water and air quality monitoring, are described in Sections 2.4.1 through 2.4.10.

2.4.1 Project Safety, Health, and Environmental Plans

Given the magnitude and complexity of this project, multiple contractors and subcontractors worked on the remediation at various work areas under differing safety hazards, and thus utilized individual Project Safety, Health, and Environmental Plans (PSHEPs) and Subcontractor Safety Plans (SSPs). These documents provided guidance for field and office activities required to complete the scopes of work associated with various operations. The PSHEPs and SSPs were updated on an annual basis during the execution of the remedy to accommodate changing work tasks, new or modified scope activities, and lessons learned.

Remedial work performed under this Remedial Action followed governmental requirements, including site and worker safety requirements mandated by the Occupational Safety and Health Administration.

2.4.2 Final Design Report

The FDR (Parsons and Anchor QEA 2012) included a combination of dredging and capping to address contamination in water and lake sediment. The document provided information on the design for remedial areas, sediment cap, habitat restoration and enhancement, areas and depths of sediment to be dredged, and dredging and capping methods. The design outlined by this document meets the objectives for remediation and long-term protection of human health and the environment outlined in the ROD.

In the littoral (shallow) zone of Onondaga Lake, the cap included the following layers: chemical isolation, erosion protection, and habitat. The different layers were designed and installed to provide long-term protection of human health and the environment and ensure that goals were met for chemical isolation, erosion protection, and habitat restoration.

2.4.3 Design Addenda

Three design addenda were issued as the dredging and capping progressed to address areas requiring additional information and provide design details finalized after approval of the FDR. A fourth design addendum pertaining to habitat restoration is in progress, and has been submitted to NYSDEC in draft; this habitat addendum will be included in a separate report. The three design addenda that pertain to the dredging and capping are discussed in further detail in Sections 2.4.3.1 through 2.4.3.3.

2.4.3.1 Remediation Area E Shoreline – August 2014

The *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design – Remediation Area E Shoreline Design Addendum* (Parsons and Anchor QEA 2014a) provided design revisions to the dredging and capping plans in RA-E adjacent to the shoreline near active railroad tracks. Three active rail lines are located immediately adjacent to the shoreline in the area south and immediately north of Onondaga Creek, adjacent to RA-E. Two of these lines are operated by CSX, and the third is operated by the New York, Susquehanna and Western Railway.

Preliminary geotechnical analysis completed as part of the Final Design indicated that dredging within approximately 150 feet of the shoreline could result in an unacceptable factor of safety for the shoreline and rail line stability, which could result in movement of the rail lines. Due to the shallow water in this area, placement of a sediment cap in this area without prior dredging would result in loss of lake surface area. Therefore, detailed dredging and capping prisms were not developed in the Final Design for the area within 150 feet from the shoreline along this portion of RA-E. The FDR stated that an appropriate approach for this area that is environmentally protective and does not negatively impact the stability of the rail lines would be developed as an addendum to the FDR.

Therefore, a final dredging and capping offset from the shoreline was developed based on the final geotechnical stability analysis, which is included in the Technical Support Document for the Explanation of Significant Differences for this area. The offset ranges from 130 to 200 feet from the shoreline. In addition, a wave damper was included with this design addendum to reduce the potential for wind/wave action to transport contaminated sediments from the shoreline area onto the capped area. A restoration approach for this area is described in the *Draft Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design Habitat Addendum* (Parsons and Anchor QEA 2016a).

2.4.3.2 Onondaga Creek Navigational Channel – August 2014

The *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design – Onondaga Creek Navigational Channel Design Addendum* (Parsons and Anchor QEA 2014b) provides design revisions associated with the dredge prism within the navigational channel leading to Onondaga Creek, located in RA-E. Subsequent to the Final Design, the New York State Canal Corporation requested that the post-capping bathymetry be consistent with the original 1915 canal design to accommodate commercial boat traffic that uses Onondaga Creek and the Inner Harbor. The original channel was wider and slightly shallower than the channel included in the Final Design. Therefore, the design was modified to comply with this request. Consistent with the Final Design, the revised design includes dredging to a sufficient depth such that the final cap surface is 2 feet below the navigational depth to prevent dredge-induced damage to the cap during future navigational dredging.

Consistent with the RA-E shoreline design addendum (Section 2.4.3.1), the same three active rail lines are also located immediately adjacent to the shoreline in the vicinity of the navigational channel. As mentioned above, geotechnical analysis indicated that dredging adjacent to the shoreline in this area, including the navigational channel within this area, could result in an unacceptable factor of safety for the shoreline and rail line stability, which could result in movement of the rail lines. Therefore, no dredging or capping was performed in this area within the navigational channel.

This addendum also addressed the six sets of pilings in the lake marking the entrance into the Syracuse Inner Harbor (Cultural Resource Feature A-7) and the set of pilings approximately 700 feet north of the navigational channel (Cultural Resource Feature A-72). These pilings were left in place, and capping and dredging was conducted up to the pilings.

2.4.3.3 Metro Outfall Vicinity – October 2014

The *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design – Metro Outfall Vicinity Design Addendum* (Parsons and Anchor QEA 2014c) provided cap design revisions adjacent to the Onondaga County Metropolitan Wastewater Treatment Plant (Metro) Deepwater Outfall. The outfall extends from the shoreline through the south corner of RA-E and into RA-D. The outfall pipeline is referred to as Outfall 1 (Subaqueous Conduit) on the historical Metro design detail drawings. It is a 60-inch-inner-diameter pipe of reinforced-concrete construction with 6-inch-thick pipe walls for a total outer diameter of 72 inches. The pipe consists of 20-foot lengths clamp-bolted together and sealed.

To avoid having an adverse effect on the outfall, the Final Design included a dredging offset of 25 feet from the outfall. The Final Design assumed a cap would be placed over the outfall pipeline, and included a 25-foot capping offset in the area around the discharge end of the pipe. The Final Design also indicated that the remedial approach adjacent to this outfall would be re-evaluated based on additional consultation with Onondaga County.
Based on discussions with Onondaga County subsequent to the Final Design, it was emphasized that this discharge is active during Metro high-flow conditions and the pipeline's integrity had to remain intact. Placing capping material on top of the pipeline had the potential to induce stress on the pipe and cause settlement of the underlying sediment, which could then result in impacts to the existing integrity of the pipeline. Therefore, a revised capping and dredging design was developed for this area.

The revised design adjacent to the deepwater outfall pipeline included the following:

- No dredging or capping within 25 feet of the pipeline
- A modified erosion-resistant cap in the zone between 25 to 100 feet from the pipeline in areas where there is minimal or no dredging prior to capping

- Revised cap chemical isolation layer based on a cap thickness of 6 inches, resulting in revised GAC application rates
- Incremental increases in cap thickness to avoid significant differential cap loading in the transition zone from the modified cap to the full thickness cap beyond 100 feet from the pipeline

2.4.4 Design Revisions

Six design revisions were issued following approval of the FDR, in the areas described as follows:

- Two areas where movement of the lake bottom occurred following placement of the initial partial caps
- Three areas where additional geotechnical investigations concluded that modifications to the original cap designs were warranted in isolated areas prior to cap placements
- One area where revisions to the shoreline were needed to protect habitat work from wind/wave erosion

2.4.4.1 Modified Protective Caps RA-D-1 and RA-C-1

Capping operations were initiated in Onondaga Lake on August 21, 2012. During capping in RA-C, movement of a small area of the cap and underlying and adjacent SMU 8 sediment was observed east of the New York State Department of Transportation (NYSDOT) turnaround area on September 5, 2012. The approximate movement of the RA-C cap and adjacent SMU 8 sediment areas was 2.5 and 7.4 acres, respectively. As part of the response to this event, a comprehensive review of site conditions and cap placement operations was undertaken by the design team, including geotechnical slope stability analyses and geotechnical data evaluations. Based on this review, capping operations were subsequently revised to reduce the likelihood of cap movement. These revisions were implemented primarily in locations that were cap-only portions of the remedy and not previously dredged. The revisions included placing cap materials in thinner placement lifts to reduce the load applied by each individual lift, increasing wait times between subsequent lifts (typically 7 or 14 days) to allow porewater pressure to dissipate prior to placing the subsequent lift, and establishing a minimum 10-foot offset between capping lifts around the perimeter of the cap area to gradually transition the cap thickness at the edge of the cap areas. These offsets were installed outside of the cap areas, effectively increasing the area over which cap materials were placed; however, these offset areas are not included in the cap area calculations.

Despite those efforts, in early November 2014, movement of the sediment cap and underlying sediments within a portion of RA-D and the adjacent SMU 8 was observed shortly following cap placement. The approximate movement of the RA-D cap and adjacent SMU 8 sediment areas was 8.7 and 16.7 acres, respectively. For a capping project of the scale of the Onondaga Lake remediation, it is not unusual to expect to incur field conditions in isolated areas throughout the implementation that may require adjustments to the cap system to achieve the remedial goals for the project.

Following these events, additional in situ geotechnical data were collected throughout the cap areas. Analyses indicated that these localized areas of movement resulted from underlying sediments that were softer than previously identified during the pre-design investigation. In addition, surface sediment samples were collected from throughout the movement areas and analyzed for the constituents used to quantify the mean probable effects concentration quotient. Subsequent design revisions were made, including modified protective caps (MPCs) in these areas of cap movement and adjacent areas of soft sediments comprising alternate cap layer thicknesses, with increased dosages of amendments and thin-layer caps in impacted adjacent areas in SMU 8. These MPC revisions are described in the following documents:

- *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design – Modified Protective Cap RA-C-1 Design Revision* (Parsons and Anchor QEA 2016b)
- *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design – Modified Protective Cap RA-D-1 Design Revision* (Parsons and Anchor QEA 2015a)

The MPCs described by these documents were designed to be protective for more than 1,000 years, consistent with the evaluation timeframe used for the Final Design.

2.4.4.2 Modified Protective Caps RA-B-1, RA-C-2, and RA-D-2

In response to the design revisions performed and implemented in RA-C and RA-D as described in Section 2.4.4.1, the design team also made the decision to proactively collect additional in situ geotechnical data in other areas of the lake where steeper slopes existed. In these targeted areas, additional geotechnical data were collected and analyses indicated that underlying sediments in isolated portions of RA-B, RA-C, and RA-D that were not yet capped were also softer than previously identified during the pre-design investigation. Thus, subsequent design revisions were made in the following MPC documents in these areas:

- *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design – Modified Protective Cap RA-B-1 Design Revision* (Parsons and Anchor QEA 2015b)
- *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design – Modified Protective Cap RA-C-2 Design Revision* (Parsons and Anchor QEA 2016c)
- *Onondaga Lake Capping, Dredging, Habitat and Profundal Zone (SMU 8) Final Design – Modified Protective Cap RA-D-2 Design Revision* (Parsons and Anchor QEA 2016d)

2.4.4.3 Wastebed B/Harbor Brook Outboard Area Wetland Optimization

Wetland optimization design revisions were incorporated into the WBB/HB Outboard Area wetlands to increase habitat diversity and wetland resilience to wind/wave action, and provide for cap surface elevations that would facilitate wetland vegetation establishment. These revisions did not impact the original cap design or protectiveness of the cap. These revisions provided for an increase in the cap thickness in some areas, and additional protection against erosion by placing protective berms around portions of the wetland to aid in their establishment.

The habitat optimization components included in this design revision were developed in part based on the results from a 1.6-acre test planting area that was initiated in the western portion of the WBB/HB Outboard Area in 2014. The full cap in this test area, including topsoil placement, and seeding and planting, was completed consistent with the FDR (Parsons and Anchor QEA 2012). As observed during subsequent monitoring, high water levels and shoreline wave energy resulted in erosion of the topsoil and loss of vegetation in the test area. The wetland optimization design addressed the challenges identified during monitoring of the test planting area as well as incorporated additional habitat benefits. Specific revisions to the Final Design included by the wetland optimization design were as follows:

- Berm installation to provide protection from wind/wave energy
- Plateaus at slightly higher elevations than the original design to provide improved conditions for establishment of wetland vegetation and reduce erosion potential in areas not directly behind the berms
- Incorporation of erosion-resistant armored edges along the outer edges of the plateaus and along the barrier wall in areas not directly behind the berms to reduce erosion potential; cobble armoring on the 5-to-1 horizontal-to-vertical slope along the barrier wall and along the transition from a plateau area to the forested wetland that included topsoil in the interstitial spaces of the cobble for planting
- Filling of hot spot dredge areas not located behind a berm to reduce shoreline slopes and provide increased cap elevations to provide improved conditions for establishment of wetland vegetation
- Changing the wetland plantings to predominantly floating aquatic species in the deeper areas behind the berms
- Modification of the plant selection to favor more robust species such as cattails and cordgrass that will provide greater resistance to wind/wave energy, and to species better able to tolerate periods of inundations such as cattail, rushes, and bulrushes (overall species diversity and total quantity of plants will be increased slightly); plant selection included species that retain standing structure through the winter to provide appropriate spawning locations for pike

The WBB/HB design optimization was described in Capping Field Change Form (FCF) 062. The FCF program is discussed in Section 2.5. This CCR includes documentation associated with the installation and approval of cap materials including habitat substrate, berms, and armored edges. Scope items associated with installation of plantings will be approved under a separate report.

2.4.5 Construction Quality Assurance Plan

The *Construction Quality Assurance Plan* (CQAP; Anchor QEA and Parsons 2012) addressed the performance of the Remedial Action tasks and documented QA/QC methodologies applied in the field and in the laboratory. The CQAP provided a detailed description of the observation and testing activities used to monitor construction quality and confirm that remedial construction was in conformance with the remediation objectives and design specifications.

Roles and responsibilities of team members outlined in the CQAP included the following:

- NYSDEC was the lead regulatory agency during construction.
- Honeywell was responsible for implementing the remediation in accordance with the Consent Decree (USDC 2007).
- Parsons provided construction management and construction quality control (CQC) activities for the capping and dredging work.
- Anchor QEA, LLC, performed construction quality assurance (CQA) for the capping and dredging work, and was in primary charge of certification of completed work, per design requirements.

The CQAP described the construction oversight activities, including CQC and CQA tasks that were undertaken to verify that dredging and capping, including habitat layer construction, was completed in accordance with the FDR. These tasks utilized Real-time Kinematic Global Positioning System (RTK-GPS) controls on dredges and hydraulic spreader barges, dredge slurry monitoring, bathymetric surveying using a single-beam dual-frequency fathometer, pole soundings and land-based conventional upland survey methods for shallow or onshore areas, cap material conformance inspections, and verification of cap layer thickness using catch pans, gravity cores, push cores, vibracores, and other survey measurements where appropriate.

2.4.6 Capping Calibration Work Plan

The *Onondaga Lake Capping Calibration Work Plan* (Parsons 2012a) described startup procedures to complete the calibration phase of capping to provide additional construction-related information pertaining to placement of the siderite and granular activated carbon

(GAC)-amended chemical isolation layers, and allow transition into full-scale capping construction. The calibration phase of capping began in August 2012, and its purposes were to further improve system performance and dosing correlations in areas where cap amendments (i.e., GAC and/or siderite) were required for the chemical isolation layer, and to confirm that the capping methods consistently achieve the layer thickness and in situ composition of the amended cap layer consistent with the design requirements.

The calibration phase consisted of a higher frequency sampling and testing program of the chemical isolation layer over an area sufficient to prove out the accuracy of the means, methods, controls, and QA/QC methods employed to place the chemical isolation layers.

2.4.7 Community Health and Safety Plan

The *Onondaga Lake Remediation Operations Community Health and Safety Plan* (CHASP; Parsons 2012b) was used to communicate planned activities for the Onondaga Lake remedy and the measures taken to protect the local community and environment during implementation of the remedy. The CHASP includes provisions for air monitoring, site security, traffic management, noise, navigation protection, spill response, emergency response planning, and community education and notification.

A hotline was established to enable the public to ask questions or register complaints. The hotline was staffed during all work activities, listed in all project announcements, and presented on the Honeywell website. Staffers addressed questions during initial communications and followed up with additional information in a timely manner. In the event of an odor complaint, a team of observers was dispatched to the location of the complaint to investigate. NYSDEC also established a project information number for members of the public who requested additional information.

2.4.8 Quality Assurance Project Plan – Air Quality Monitoring Program

The purpose of the *Quality Assurance Project Plan* (QAPP; O'Brien and Gere 2012) was to detail the QA/QC procedures used to maintain data accuracy and completeness for the air quality monitoring program for the Onondaga Lake capping and dredging work. The air quality monitoring program was described in the CHASP (see Section 2.4.7). The QAPP pertained to air quality monitoring for the protectiveness of the community and did not pertain to air quality monitoring associated with the protection of project workers that was conducted under a separate program.

Air quality monitoring was conducted at up to five locations along the lake shoreline adjacent to active capping and dredging areas (Figure 3-1). Monitoring was conducted for total volatile organic compounds (VOCs), mercury, sulfides, particulates, and nuisance odors. Air quality monitoring was also conducted at eight locations around the perimeter of the sediment consolidation area (SCA) located at the Honeywell Wastebeds 12-15 site. Air quality monitoring results will be documented in the Onondaga Lake Dredge and Cap Air Monitoring report to be issued later in 2017.

2.4.9 Citizen Participation Plan

NYSDEC, in cooperation with Honeywell and Parsons, developed the *Citizen Participation Plan for the Onondaga Lake Bottom Subsite Remedial Design Program* (CPP; NYSDEC 2009) for communication with the public during the remediation of the Onondaga Lake bottom. The CPP described the site and remediation program, and identified specific community outreach and participation activities. It also provided locations where reports and information could be obtained, and contact information for members of the public who had specific questions and concerns.

2.4.10 Water Quality Management and Monitoring Plan

The *Water Quality Management and Monitoring Plan* (WQMMP; Anchor QEA 2012) established a comprehensive water quality management and monitoring program to manage and monitor potential unacceptable water quality impacts resulting from construction activities. The following were the goals and objectives of the WQMMP:

- Describe water quality management and control measures.
- Provide procedures and protocols to monitor water quality during dredging and capping activities.
- Establish response actions in the event unacceptable conditions were detected.

Water quality alert and action levels, management activities, controls such as turbidity curtains, water quality monitoring program elements, and potential response activities were described in detail in the WQMMP. The water quality alert and action levels were developed such that an efficient and environmentally protective program was implemented.

The program included real-time turbidity monitoring supplemented periodically with samples analyzed for chemicals of interest. This program monitored the impacts of dredging and capping and provided for rapid implementation of response actions, if warranted.

See Section 6 for a summary of the water quality monitoring results.

2.5 Field Change Forms

FCFs were used as needed during construction to clarify, amend, or revise components of the FDR, design addenda and revisions, or CQAP. The FCFs include information regarding the original requirements, proposed field change including the reasoning for the change, and required approvals. Each FCF was reviewed and signed by the appropriate representatives for the Design Engineering Team (Parsons and Anchor QEA), owner (Honeywell), and regulatory agency (NYSDEC), and was not implemented until approved by these representatives.

Twelve FCFs pertaining to dredging activities were approved over the duration of dredging from 2012 through 2014. FCFs pertaining to dredging activities are included in Appendix 2A, and a summary of each is included in Table 2-1.

Fifty FCFs pertaining to capping activities were approved over the duration of capping from 2012 through 2016. FCFs pertaining to capping activities are included in Appendix 2B, and a summary of each is included in Table 2-2.

3 PROJECT MANAGEMENT

This section provides a summary of the primary agencies, contractors, and consultants who performed the work, site preparation improvements installed prior to and during remedial activities, and the documents that were prepared to manage the remedial activities.

3.1 Remediation Team – Roles and Responsibilities

This section summarizes the primary agencies, contractors, and consultants responsible for constructing the site remedy. NYSDEC provided regulatory oversight throughout remedy implementation (Section 3.1.1). Honeywell maintained overall responsibility for the execution of the project in accordance with the ROD, Consent Decree, and FDR (Section 3.1.2). The roles and responsibilities of key remedial team members are described in Sections 3.1.3 through 3.1.6.

3.1.1 Regulatory Oversight

NYSDEC was the lead regulatory agency. NYSDEC's Project Manager or his representative participated in daily and weekly progress meetings, had access to the work, reviewed and approved completed Dredge Management Unit (DMU) and Cap Management Unit (CMU) Completion Forms, and approved changes or modifications using FCFs. USEPA served as a support regulatory agency, and provided review of project reports and other documentation during the remedy construction.

3.1.2 Program Management

Honeywell was responsible for implementing the remediation in accordance with the Consent Decree (USDC 2007), and provided overall program management and community outreach. Honeywell retained de maximis, inc., to provide dredging and capping contract management, and field oversight of sediment dewatering operations at the SCA.

3.1.3 Construction Management and Quality Control

Parsons provided construction management and CQC activities for the duration of the construction. Construction activities were directed by the Parsons Site Manager, who was supported by field engineers, technicians, and subcontractors for implementing the dredging and capping work. Parsons also managed CQC activities associated with dredging and capping activities. The CQC team prepared technical submittals, performed CQC testing, oversaw and managed CQC testing performed by their subcontractor(s) and independent testing laboratories, and documented CQC results.

Engineering support was provided by Parsons as needed to review construction submittals, Requests for Information, and design modifications that required engineering interpretation. When modifications to the approved FDR were requested, approval by the Design Engineer, or his designee, was provided. Parsons retained Geosyntec to provide specialized geotechnical analysis related to the design revisions that were issued following approval of the FDR; Geosyntec also provided design services and construction oversight for the SCA under contract to Parsons.

Parsons also conducted some aspects of the construction work, including topsoil placement, shoreline stabilization, shoreline excavation, and sediment dewatering.

3.1.4 Contractor Services

Sevenson Environmental Services, Inc. (Sevenson), served as the dredging and capping contractor. Parsons initially managed Sevenson's activities to ensure execution of the work in accordance with the FDR, including performance of CQC tasks performed by Sevenson. From 2014 through completion of the project, Honeywell contracted directly with Sevenson for dredging and capping work execution.

Infrastructure Alternatives Incorporated provided sediment dewatering services during dredging operations, including dredged slurry monitoring, polymer dosing, and geotextile tube deployment, filling, and management.

3.1.5 Construction Quality Assurance and Water Quality Monitoring

Anchor QEA performed CQA for the dredging and capping operations, and monitored for water quality compliance during construction. Anchor QEA's team was led by the CQA Director who reported directly to Honeywell. Daily project activities were overseen by Anchor QEA's CQA Manager, who had a direct line of communication with Honeywell's

Remediation Design and Construction Manager, as well as Honeywell's Lake Program Manager. Anchor QEA's CQA Manager was supported by a staff of field engineers and technicians from Anchor QEA for the various work elements.

The CQA Manager and team were on site daily to observe construction activities and perform CQA activities. The CQA Manager provided support to the construction team by providing CQA data and results, as well as attending construction, safety, and on-site agency meetings, reviewing construction submittals including completed dredging and capping records, and coordinating with Honeywell representatives.

Engineering support was also provided by Anchor QEA as needed to review construction submittals, Requests for Information, and design modifications that required engineering interpretation. When modifications to the approved FDR were requested, approval by the Design Engineer, or his designee, was provided.

3.1.6 Water Treatment and Air Monitoring

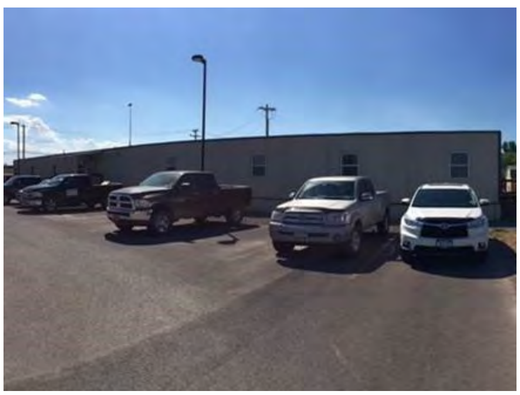
O'Brien and Gere Engineers (OBG) provided design, construction, and operation of the water treatment plant (WTP) located adjacent to the SCA. OBG also conducted air quality monitoring during construction in accordance with the air quality monitoring program, including follow-up through the mobile air quality monitoring unit when notified of citizen complaints.

3.2 Site Preparation

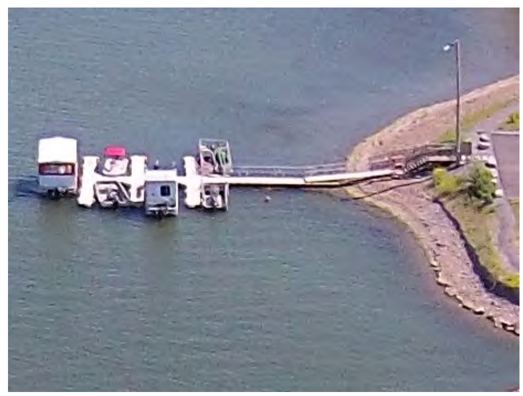
Extensive site preparation was required to prepare the lakeshore area to support the remedial construction activities. Shoreline site preparations adjacent to Onondaga Lake included the following:

- Construction of a lakeshore office complex on the south shore at the NYSDOT turnaround area
- Installation of a paved construction access road
- Installation of a pile-supported, concrete loading pad adjacent to the lake shoreline

- Construction of a double-walled dredge slurry pipeline with four associated booster pump stations for conveyance of dredged slurry to the upland sediment processing area
- Construction of equipment and material laydown areas
- Installation of lighting
- Construction of infrastructure to support the hydraulic capping operations including upland storage tanks, pumps, and conveyors
- Installation of utilities to support construction equipment and facilities
- Construction of a dock for marine equipment and personnel access, and installation of other access points for lake work (dredging and capping) along the shoreline areas



Lakeshore Office Complex



Marine Equipment Dock

3.3 Construction Reports

Honeywell provided daily reports summarizing dredging, capping, and SCA activities to the regulatory agencies and other interested parties. The daily reports included dredging location, operating hours, quantity of material dredged, and comments. Capping summaries were divided between hydraulic and mechanical capping operations and included location, operating hours, quantity of cap placed, and comments. The daily reports also included a summary of activities at the SCA, including a summary of the sediment processing and water treatment operations.

4 DESCRIPTION OF REMEDIAL ACTIONS – DREDGING

This section summarizes sediment removal (dredging) and management activities completed for the lake. The remedial activities were performed as described in FDR (Parsons and Anchor QEA 2012) and subsequent addenda and revisions, as summarized in Sections 2.4.3 and 2.4.4, respectively.

4.1 Hydraulic Dredge Implementation

The FS (Parsons 2004) completed for the lake concluded that hydraulic dredging was the most suitable method of sediment removal. The management of hydraulically dredged sediment encompassed processes, equipment, and infrastructure associated with the dredging, conveyance, and dewatering of the removed sediments. Design plans for the sediment management portion of the project were described in the *Onondaga Lake Sediment Management Final Design* (Parsons 2011a). The sediment management system consisted of three main components: slurry conveyance, slurry processing, and sediment dewatering. These systems were designed in conjunction with the selection of the hydraulic dredging equipment and design of the WTP, to ensure each of the components could operate under the range of conditions anticipated. The construction and operation of these systems are described briefly in Sections 4.1.1 through 4.1.5.

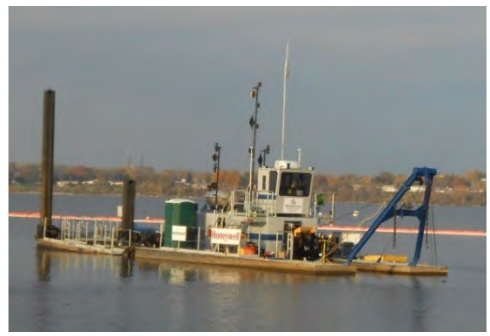
4.1.1 Hydraulic Dredging

Multiple dredges were available to maximize dredging efficiency, and allow the flexibility to operate in multiple areas simultaneously or in differing site conditions (e.g., water depth and cut thickness). The dredging subcontractor (Sevenson) maintained a fleet of three dredges that were available for use during dredging activities as follows:

- Dredging Supply Company, Inc. (DSC), Marlin 7650D dredge with a 16-inch-diameter discharge line and a 30-foot spud carriage

16-inch Dredge (Marlin Class)

- DSC Shark 75450D dredge with a 14-inch-diameter discharge line and a 30-foot spud carriage



14-inch Dredge (Shark Class)

- DSC Moray 2000D swinging ladder dredge with an 8-inch-diameter discharge line

8-inch Dredge (Moray Class)

The 16-inch dredge was used as the primary production dredge, and focused on areas with thick dredge cuts for maximum operational efficiency. The 16-inch dredge operated for approximately 72% of the total dredge hours. The 14-inch dredge was used as a production dredge when the 16-inch dredge was unavailable, when operational needs required frequent transitioning of dredging operations between different portions of the lake, or to make thin cleanup passes in previously dredged areas. The 14-inch dredge operated for the remaining 28% of the total dredge hours. The 8-inch dredge was available as a specialty dredge for areas of shallow water or for thin dredge cuts; however, sufficient water draft was available for either the 14-inch or 16-inch dredge for the duration of the project and the 8-inch dredge was never operated.

All dredges were equipped with state-of-the-art controls, monitoring, tracking, and communication equipment that provided advanced levels of control including position, data collection, and production tracking. These controls included RTK-GPS combined with DREDGEPACK software and other positioning equipment (e.g., inclinometer and tilt sensors) that were used on the dredges to track horizontal and vertical positions of the cutterhead in real time.

In total, 2.15 million cy of sediment were removed from the lake across 215 acres from July 2012 through October 2014. Dredge removal volumes averaged approximately 300 cy per hour while actively dredging, and approximately 5,300 cy per day.

4.1.2 Slurry Conveyance

The slurry conveyance consisted of a 4-mile-long slurry pipeline, four booster pumps, and various supporting systems and components.

The alignment of the pipeline generally followed the *Onondaga Lake Sediment Management Final Design* (Parsons 2011a), with minor deviations to accommodate field conditions encountered during the installation. The pipeline route generally followed the I-690 corridor to its intersection with Ninemile Creek, after which it followed the Creek and State Fair property to the Honeywell Wastebeds 12-15 site (Figure 1-1). The slurry pipeline comprised double-walled high-density polyethylene (HDPE) pipe. The inner slurry conveyance pipe had an outer diameter of 16 inches and inner diameter of 12.3 inches, and the outer secondary containment pipe had an outer diameter of 22 inches. The double-walled pipe was located primarily aboveground except for limited locations where road/rail crossings required burial, and in a limited area of the State Fair black lot where State Fair use of the property dictated burial. Four electrical-powered, 600-horsepower booster pumps were spatially distributed along the pipeline to provide sufficient pressure head to convey the slurry to the dewatering area.

Dredge Slurry Pipeline

Dredge Booster Pump

To safeguard against potential leaks, several leak detection features were built into the system. The interstitial space between two walls of the double-walled pipe was monitored for pressure fluctuations. In addition, liquid leak detection points were constructed at low points along the pipeline alignment, where any potential liquids leaking from the inner pipeline would migrate. Booster pumps were situated in lined, walled enclosures, which were designed to contain a volume of slurry corresponding to the volume contained in the pipeline from the booster pump to the next "high" spot in the pipeline. The enclosure included a sump, which had level sensors in the event of a pipeline or pump leak. These systems featured alarm functions, which tied into the overall control system that monitored all equipment, from the dredge to the WTP. Operators monitoring the system had the capability to completely shut the system down, if needed.

During the 3-year period in which the dredging occurred, an inspector walked the entire length of the pipeline daily, monitoring for any potential changes or issues that would need to be addressed. In addition, pipe wall thickness was monitored on a routine basis. Based on these readings, several steps were taken over the course of the project to extend the life of the pipeline and prevent potential leaks. These steps included rotation of the pipeline, modification of the route to reduce the number of fittings (e.g., elbows), and full replacement of pipe sections and fittings.

Overall, the slurry pipeline functioned within design parameters, with an overall system uptime of greater than 95%. Following completion of the dredging activities, the pipeline system was decommissioned, and deconstructed, in accordance with the NYSDEC-approved

Dredge and Dewatering System Decommissioning Plan (Parsons 2014). Project underground road/rail crossings are being evaluated for potential reuse by others. Any crossings not transferred to others will be terminated in compliance with their respective occupancy permits.

4.1.3 Slurry Processing

The slurry processing system consisted of a polymer mixing and injection system, three slurry thickeners with debris screens, and conveyance pumps to the SCA located at the Honeywell Wastebeds 12-15 site.

The polymer injection system comprised a mixing station where dry polymer was blended with potable water, aging/storage tanks, and a series of pumps, which provided capacity to inject the polymer into the slurry at multiple points in the process and at various flow rates. Injected polymer facilitated rapid separation within the thickeners, and within the geotextile tubes. Operators continuously monitored the slurry flow rate, so that the proper dosage of polymer was added to optimize these processes without resulting in excess residual polymer being discharged to the on-site WTP, which had the potential to disrupt treatment processes.

Debris screens were located on top of three slurry thickeners and removed large debris and large chunks of dredged material prior to the slurry entering the thickener. Debris removed by the screens was routed, via material handling belts, to dump trucks, which transported the debris to a designated area within the SCA. Debris screens were housed within enclosures that were maintained at negative air pressure. Air drawn from these enclosures was routed to a carbon treatment system.

The slurry thickeners were added to the slurry processing following finalization of the *Sediment Management Final Design* (Parsons 2011a). These thickeners allowed for the diversion of a portion of the slurry to carry water directly to the WTP, which decreased the sizing requirements of the downstream operations. Operational issues associated with the thickeners, such as foam generation, were identified and mitigated through the incorporation of spray bars and defoaming agents. The thickeners were also maintained at negative air pressure, with captured air routed to the carbon treatment system.

Polymer Aging/Storage Tanks

Dredge Slurry Thickener Tanks

The final component of the slurry processing system was a series of three geotextile tube feed pumps, which drew thickened slurry from the thickeners and routed it to the SCA. During operations, the optimum range of operating conditions for these pumps exceeded design expectations. As a result, a fourth pump located downgradient of these three was added to the system.

Overall, the slurry processing system functioned within design parameters, with an overall system uptime of greater than 95%. Following completion of the dredging activities, the slurry processing system was decommissioned, and deconstructed, in accordance with the NYSDEC-approved *Dredge and Dewatering System Decommissioning Plan* (Parsons 2014).

4.1.4 Sediment Dewatering

Sediment dewatering was conducted at the 55-acre SCA, which was constructed for the project. The NYSDEC-approved design for the SCA was documented in the *Onondaga Lake SCA Civil and Geotechnical Final Design* (Parsons 2011b). Construction of the SCA was completed in two phases. Construction activities began in 2010 and were completed in 2012. Construction details of the SCA was documented in two separate reports—*Phase I – Sediment Consolidation Area Construction Quality Assurance (CQA) Final Report* (Geosyntec 2012) and *Phase II – Sediment Consolidation Area CQA Final Report* (Geosyntec 2013).

Sediment dewatering within the SCA was accomplished by means of geotextile tubes. Conditioned slurry was pumped into multiple tubes simultaneously, which allowed filtrate to weep through the tube mesh openings, while dewatering sediments remained within the tube. A total of 979 tubes of up to 300 feet in length were filled during the project. Geotextile tubes were stacked into five layers. Deployment and filling of the tubes were completed in consultation with design engineers, and considered monitored settlement of the SCA, water flow, rate of sediment dewatering, and other considerations.

SCA During Dredging

SCA Post-Dredging

SCA During Cover Placement

During dredging operations, several enhancements and modifications were made within the SCA and to the dewatering process, to incorporate various measures to reduce and/or eliminate the potential for odor generation. These measures were identified in the NYSDEC-approved *Sediment Management Winter 2013 Additional Odor Mitigation Plan* (Parsons 2013).

Overall, the sediment dewatering system functioned within design parameters, with an overall system uptime of greater than 98%. Following completion of dredging activities, the closure of the SCA in accordance with design documents was initiated. This closure will be documented in a future Construction Competition Report specific to the SCA.

4.1.5 Water Treatment

Process water from the slurry thickeners, decant water from the geotextile tubes, and stormwater collected in the SCA and slurry processing areas were directed to the on-site WTP. The WTP was constructed near the southeast corner of the SCA prior to the initiation of dredging.

SCA Water Treatment Plant

The SCA WTP construction was completed in July 2012 and commissioned on July 17 and July 19, 2012, per NYSDEC and Onondaga County Department of Water Environment Protection (OCDWEP) requirements. The commissioning data were sent to NYSDEC and OCDWEP on July 24, 2012, and the plant began operation on July 24, 2012. The SCA WTP operated under OCDWEP Permit No. 802 when discharging to the Metro facility and State Pollutant Discharge Elimination System-equivalent Permit No. 89-CV-815 when discharging directly to Onondaga Lake (Appendix 4B). Effluent data were submitted monthly to both the NYSDEC (Discharge Monitoring Reports) and OCDWEP (Self-Monitoring Reports) as required by their respective permit requirements. During dredging operations from 2012 through 2014, the WTP processed up to 6.5 million gallons per day (MGD), and averaged approximately 5 MGD. Approximately 2 billion gallons of water were processed from 2012 through 2014.

The influent flow to the WTP was split between a pair of pH adjustment trains. Each train consisted of four mix tanks, configured in series. Sulfuric acid or sodium hydroxide was added to the first and third tanks of each train to achieve coarse and fine control of pH to approximately 8.5 standard units. This pH value was targeted for optimal precipitation of metals from the water. Aluminum sulfate (alum) was also added at each pH adjustment train. The pH-adjusted water was subsequently dosed with polymer and subjected to flash mixing.

Following pH adjustment, the water was sent to an inclined plate clarifier (IPC) system; this system consisted of seven IPCs configured in parallel. Any IPC system could be isolated to allow for servicing or when the flow through the WTP was reduced. A flocculation tank was located upstream of each IPC for the agglomeration of solid particles. Suspended solids settled and accumulated in the base of each IPC vessel. This resulting sludge was transferred to a holding tank and subsequently pumped back to the SCA for disposal of the solids.

pH Adjustment Tanks

Top of Inclined Plate Clarifiers

Supernatant from the IPC vessels gravity-flowed to a filter feed tank. Water from the filter feed tank was conveyed by progressive cavity pumps to multimedia filter (MMF) vessels. Three horizontal MMF vessels were configured in parallel; each vessel was configured with two chambers/beds. The MMF systems provided polishing filtration of solids that carried over from the IPC systems. Individual MMF beds were periodically backwashed (using WTP-treated effluent water) and the filtered solids were transferred to the backwash pumping station. This pumping station discharged the filtered solids to the SCA for disposal.

MMF effluent (or filtrate) was directed to liquid-phase granular activated carbon (LGAC) vessels. Eight LGAC systems were installed in parallel; each system included two pressure vessels, installed in lead/lag configurations. VOCs and SVOCs were adsorbed by the LGAC media. When the LGAC media in any vessel reached the adsorption capacity, the system was isolated and the media was replaced. Individual LGAC beds were periodically backwashed (using WTP-treated effluent water) and accumulated solids were transferred to the backwash pumping station.

LGAC effluent was discharged to the effluent monitoring tanks for final pH adjustment, as necessary. The treated effluent was typically pumped from there to the Metro facility for supplemental treatment and ultimate discharge to Onondaga Lake. Flow from the SCA WTP to Metro was temporarily halted during significant precipitation events; for the 2014 dredging season, a limited amount of water was discharged directly from the WTP to Onondaga Lake during such events, in accordance with a waiver issued by NYSDEC.

LGAC Vessels

Bulk Chemical Storage

During dredging operations, the WTP maintained an overall system uptime of greater than 96%. During the winter months, dredging operations were suspended and the WTP treated significantly reduced flows from the SCA and snow melt. These reduced flows were managed by shutting down treatment trains. Typically, one pH adjustment train, one IPC, one MMF vessel, and one LGAC pair were operated.

At the completion of dredging operations, the flow rate through the WTP was permanently reduced. Some of the tanks, IPC systems, LGAC systems, and other process equipment were taken offline for removal. It is anticipated that one treatment train will be retained for the treatment of water from precipitation (during closure of the SCA) and passive flows from the geotextile tubes.

4.2 Mechanical Dredging

In addition to the hydraulic dredging described in Section 4.1, a portion of the WBB/HB Outboard Area adjacent to RA-D and RA-E was dredged mechanically. The mechanical dredging in the WBB/HB Outboard Area was performed by Parsons in January 2013 and by Sevenson from January to March 2014. The WBB/HB Outboard Area consisted of vegetated wetland and upland soils. Mechanical dredging was performed for a portion of the WBB/HB Outboard Area because hydraulic dredging in this area would have been adversely affected by hard material, phragmite root mass, and water depth limitations. Mechanical removal was completed using standard earth-moving equipment (e.g., excavators and dump trucks).

During the winter of 2013, a portion of the WBB/HB Outboard Area was mechanically removed. This dredging occurred in the portion of the WBB/HB Outboard Area corresponding to DMUs DE-D4 to DL-D4, and simultaneously removed upland soils above the lake surface water elevation and the phragmite root mass in this area. Following the mechanical removal of these upland soils, the remainder of the removal in these DMUs at and below the lake surface water elevation was completed hydraulically. A total of 30,195 cy of upland soils were mechanically removed from the WBB/HB Outboard Area during the winter of 2013 mechanical dredging event.

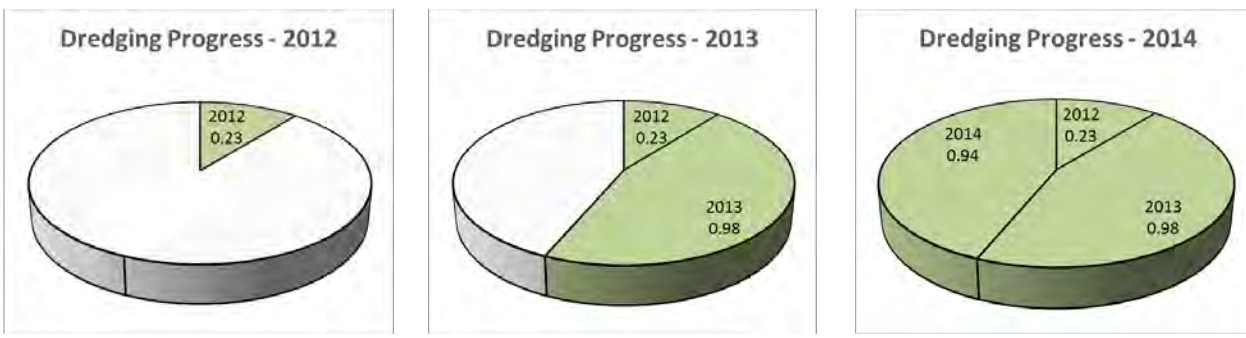
During the winter of 2014, DMUs EA-E6, EA-E7, EZ-E6, and EZ-E7 in the WBB/HB Outboard Area were dredged above the lake surface water elevation to remove the phragmite root mass in the area. In addition, a portion of the WBB/HB Outboard Area was fully dredged to the design elevation over an approximately 1,600-foot-long and 50-foot-wide area directly adjacent to the barrier wall in DMUs DH-D4 through DL-D4. This dredging was completed due to shallow draft that limited the accessibility of the area to hydraulic dredging equipment. A total of 33,741 cy of upland soils were mechanically removed from the WBB/HB Outboard Area during the winter of 2014 mechanical dredging event.

Mechanically excavated soils were transported from the WBB/HB Outboard Area and managed in a manner consistent with the *Response Action Document, Wastebed B/Harbor Brook Site, Subsite of the Onondaga Lake Site, Outboard Area Interim Remedial Measure*

(NYSDEC and USEPA 2012), and the *Materials Management, Grading, and Disposal Plan – Wastebed B/Harbor Brook Site* (O'Brien and Gere 2013).

4.3 Dredge Schedule

Mobilization for dredging was initiated in April 2012. Test runs of the dredging system were initiated on July 17, 2012, and full-scale dredging commenced on July 30, 2012. Dredging typically occurred 24 hours per day and 6 days per week (Monday through Saturday), with periodic shutdowns during holidays or for adverse weather conditions. Sundays were used for refueling and maintenance. Dredging operations were shut down from mid-November through early-April. Dredging concluded on October 28, 2014. Season-by-season progress was as follows:



Season-by-Season Dredging Progress
(values in millions of cubic yards)

4.4 Post-Dredging Verification

The lake was divided into RAs, which were subdivided into DMUs to facilitate continuous tracking of dredging progress and post-dredge verification. Each DMU consisted of a 400-foot by 500-foot grid and was subdivided into 20 grid sections, each 100 feet by 100 feet. This tracking system allowed all parties to quickly and accurately recognize the portion of the lake in which the dredge was operating. The DMUs are shown in Figure 4-1.

4.4.1 Construction Quality Control Surveying

As part of the CQC program, single-beam dual-frequency bathymetric surveys were completed in each DMU to monitor progress and to verify that dredging was completed to the horizontal and vertical extents required by the design. CQC bathymetric surveys were performed by Parsons or Sevenson. In water depths shallower than approximately 2 feet where the use of a fathometer was not practical, post-dredging verification surveys were performed using a more suitable methodology including GPS pole soundings.

Bathymetric surveys for dredging (in water depths greater than approximately 2 feet) were completed along tracklines spaced 25 feet apart in two directions, with tracklines oriented perpendicular to one another to form a grid pattern. Conventional land-based surveys were used in shallow-water areas (water depths shallower than approximately 2 feet), with survey measurements taken at a maximum spacing of 10 feet along each grid line or noted changes in grade. Sevenson processed the survey data obtained to verify achievement of design target elevations.

Completed DMUs for RA-A through RA-E are shown in Figures 4-2 through 4-6.

4.4.2 Construction Quality Assurance Surveying

To corroborate the CQC survey results, independent CQA dredge surveys were completed by Anchor QEA. The CQA surveys used similar methods and equipment as the CQC surveys, including 25-foot trackline spacing and the use of single-beam dual-frequency survey equipment. The CQA surveys were completed over a minimum of 10% of the dredged area within each DMU, and the CQA survey data were compared to the CQC survey data to validate the accuracy of the CQC survey results. The CQA survey coverage areas are shown in Figures 4-7 through 4-11.

4.4.3 Post-Dredging Completion Metrics

As described in the FDR (Parsons and Anchor QEA 2012), dredging was considered complete within non-ILWD DMUs (RAs A, B, C, and E) when post-dredging surveys of the actual dredge footprint confirmed that the required dredge elevation was achieved over 90% of the dredge surface area of a given DMU, with the following additional requirements:

- Areas within a DMU above the required elevations (i.e., up to 10% total) were relatively isolated (i.e., non-contiguous and less than 1,000 square feet).

- No more than 5% of the total dredge area within a DMU and no contiguous area larger than 1,000 square feet within this 5% were permitted to exceed the target elevation by more than 0.5 foot.
- In areas where the target post-capping water depth is within 2 feet or less of the lake surface elevation (362.5 feet North American Vertical Datum of 1988 [NAVD88]), the minimum dredge cut must be met in 100% of the area to ensure adequate depth for cap placement, with no loss of lake surface area, and to establish appropriate habitat-related water depths.

Within the ILWD (RA-D), the dredge cut line was developed to achieve an average removal of 2 meters, applied individually to the area of the ILWD within SMUs 1, 2, and 7, plus hot spots, as required by the ROD. Therefore, the dredging goal within the ILWD was to achieve the specified cut line with an average tolerance of plus or minus 0.5 foot. Final compliance was based on demonstrating that the amount of overcut was equal to or greater than the amount of undercut and that there were no contiguous areas larger than 100 square feet with an undercut greater than 1 foot. To verify compliance with the ROD, post-dredge CQC surveying was performed in the ILWD to confirm that, at a minimum, the required volume equivalent to a 2-meter average removal (plus the volume of the hot spots) was removed and to demonstrate that the amount of overcut was equal to or greater than the amount of undercut within each individual SMU of the ILWD (SMUs 1, 2, and 7).

4.4.4 Dredge Management Unit Completion Forms

Once post-dredging surveys certified that dredging within a DMU was complete in accordance with the metrics described in Section 4.4.3, a DMU Completion Form was prepared to document the dredging and the survey results. Supporting documentation compiled for each DMU Completion Form included the following:

- Area dredged within the DMU
- Volume of material dredged within the DMU
- Vertical and horizontal limits and extents of dredging, displayed as a map
- Final dredged elevations compared to the target dredge elevation, displayed as a map

- For non-ILWD areas, percentage of DMU where the final dredged elevation achieved, or was below, the required dredge depth (required to be 90% or greater)
- For ILWD areas, summary of average dredge depth relative to target removal depth

The contents of each DMU Completion Form were reviewed and approved by the following parties:

- Contractor's Representative (Sevenson)
- Project Engineer (Parsons)
- CQA Manager (Anchor QEA)
- Lake Program Manager (Honeywell)
- Regulatory agency (NYSDEC)

Honeywell coordinated closely with NYSDEC following dredging in each DMU to document that the post-dredging completion metrics were achieved. The DMU was not considered complete, and capping was not performed in any dredge area, until all parties reviewed and accepted the contents of the DMU Completion Form. There were 122 DMUs completed during the duration of dredging, and all DMU Completion Forms are included in Appendix 4A.

4.5 Sediment Removal Summary

In total, 2.15 million cy of sediment were removed from the lake from the areas shown in Figures 4-2 through 4-6. Tables 4-1 through 4-5 contain summaries of the dredging categorized by DMU for RA-A through RA-E, respectively. Dredge removal thicknesses are shown in Figures 4-12 through 4-16 for RA-A through RA-E, and Figures 4-17 through 4-21 show a comparison of final dredge elevations to the design elevations included in the FDR.

All hydraulically dredged materials were pumped within a double-walled dredge slurry pipeline to the SCA located on Honeywell-owned property in Camillus, New York, for dewatering and containment in geotextile tubes as described in Section 4.1.4. The mechanically excavated soils were transported from the WBB/HB Outboard Area and managed in a manner consistent with the *Materials Management, Grading, and Disposal Plan – Wastebed B/Harbor Brook Site* (O'Brien and Gere 2013).

5 DESCRIPTION OF REMEDIAL ACTIONS – CAPPING

This section describes the remedial activities relating to the placement of cap materials in Onondaga Lake. This section also describes CQC and CQA tasks that were performed to observe whether capping was completed in accordance with the FDR, design addenda, and design revisions. The CQC and CQA activities verified that the cap materials were placed within specified areas, the required thicknesses of the individual cap layers were achieved, the required siderite and GAC dosages were achieved where applicable, and the design cap surface elevations were met.

5.1 Materials Verification

This section presents measurements and analyses that were performed to demonstrate that cap materials used in Onondaga Lake met the specifications required by the FDR.

As part of the CQC program, Parsons (or their vendors) conducted sampling and analyses on the materials that were used for each cap layer and reviewed material certifications provided by the suppliers. As part of the CQA program, Anchor QEA witnessed a portion of the sample collections at the source(s) and reviewed material certifications provided by the suppliers.

The following cap materials were placed:

- Siderite
- GAC
- Aggregate materials:
  - Medium sand
  - Gravelly sand
  - Fine gravel
  - Coarse gravel (Type A)
  - Graded gravel
  - Gravelly cobble
  - Coarse cobble
- Topsoil

5.1.1 Siderite

Siderite was supplied by Sidco Minerals, Inc., of Linden, Texas. Siderite was shipped by rail in railcars containing 100 tons of siderite from the mine to a covered storage facility located in Fulton, New York. The siderite was transported to the lake from Fulton by truck on an as-needed basis. Approximately 14,660 tons of siderite were delivered to the lake for incorporation into the chemical isolation layer portion of the cap.

Prior to initiating a bulk shipment of siderite by rail, the mine collected samples for laboratory and sieve analysis for ferrous carbonate content and particle size, respectively, to ensure compliance with the material requirements as outlined in Section 5.2.1 of the CQAP (Anchor QEA and Parsons 2012).

Beginning in April 2013, an X-ray fluorescence (XRF) analyzer was utilized in lieu of submitting ore samples for laboratory analysis to determine the ferrous carbonate content of the siderite ore. Prior to using the XRF analyzer exclusively, tests were performed on several ore samples using both the XRF analyzer and laboratory analysis to prove the reliability of the XRF analyzer and establish a correlation between the XRF and laboratory results.

The CQC and CQA teams reviewed weigh tickets and the supplier-provided results of laboratory/XRF and sieve analysis to certify that the siderite complied with the chemical and physical criteria specified in the design prior to its use in the cap.

Laboratory results for siderite analyses performed from 2012 and 2013 are included in Appendix 5A and a tabulated summary of these results is presented in Appendix 5B. XRF results for siderite measurements performed from 2013 through 2016 are summarized in Appendix 5C. Sieve analyses performed from 2012 through 2016 are included in Appendix 5D and a tabulated summary of these results is presented in Appendix 5E.

5.1.2 Granular Activated Carbon

GAC was delivered to the lake using bulk truck deliveries or super sacks. Truck deliveries contained approximately 40,000 pounds of GAC, and this was the primary delivery method used for supplying the GAC storage and delivery tanks; these tanks were used to supply GAC while hydraulically placing the sand-GAC layer. Section 5.2.1 provides additional information on hydraulic GAC amendment mixing and placement. Super sacks contained 2,000 pounds of GAC each, and this delivery method was typically used for supplying GAC for mechanical cap placement. Section 5.2.2 provides information on where and how the mechanical GAC amendment mixing took place and doses were verified. Approximately 15 million pounds of GAC were delivered to the lake for incorporation into the chemical isolation layer portion of the cap.

Shipments of GAC adhered to the requirements outlined in Section 5.2.2 of the CQAP (Anchor QEA and Parsons 2012). Prior to shipment, the supplier (Calgon Carbon) provided laboratory results and an affidavit of compliance certifying that the GAC complied with the physical and chemical criteria specified in the design. These certifications were reviewed by the CQC and CQA teams prior to use of the GAC in the cap.

Laboratory results and manufacturer certifications for GAC delivered to the lake are included in Appendix 5F and a tabulated summary of these results is presented in Appendix 5G.

5.1.3 Aggregate Materials

Aggregate materials (i.e., sands and gravels) were received from 18 quarries. Table 5-1 lists these sources of imported aggregate materials, including a summary of the amount of material imported to the lakeshore from each of these quarries for use in capping.

Approximately 4.5 million tons of aggregate material were delivered to the lake for cap construction. During construction of the cap from 2012 to 2016, aggregate materials were delivered to the lake at an average rate of nearly 180 trucks per day, delivering an average of 5,900 tons of aggregate materials. During the capping season with the highest production (2014), aggregate deliveries averaged 255 trucks and 8,400 tons per day, and daily deliveries often exceeded 10,000 tons.

Prior to importing these materials to the lakeshore, Parsons collected CQC samples of the aggregate materials for laboratory analysis and collected bulk samples for sieve analysis at regular intervals. Parsons collected CQC samples at rates higher than the minimum required frequency specified in Section 5.2.3 of the CQAP (Anchor QEA and Parsons 2012). CQA observations of the CQC sample collection at the source was also conducted on approximately 10% of the samples as specified in Section 5.2 of the CQAP.

5.1.3.1 Aggregate Chemical Analysis

Prior to transporting aggregate materials to the lakeshore for eventual use as cap material, samples were collected in situ at each quarry and submitted for laboratory analysis. The analytical results were compared to the Unrestricted Use Soil Cleanup Objectives listed in NYSDEC 6 NYCRR Part 375, consistent with the CQAP. The in situ sampling program confirmed and documented that the materials from each source location used for the cap construction complied with the Unrestricted Use Soil Cleanup Objectives before mining the material or transporting it to the lakeshore.

Capping FCF 004 provided clarification and modification to the CQAP stipulating that only sand grain samples were to be collected for laboratory analysis, and coarse cap materials (fine gravel and coarser) were exempt from laboratory analysis. This exemption is described in NYSDEC Technical Guidance for Site Investigation and Remediation (6 NYCRR Part 375), pertaining to importing material without chemical testing provided that the material contains less than 10% by weight material which would pass through a size 80 sieve, and is comprised of gravel, rock, or stone consisting of virgin material from a permitted mine or quarry.

Sample collection frequency is summarized in Table 5-2. Chemical analytical results for sand samples collected from each quarry are presented in Appendix 5H and tabulated summaries of these results are presented in Appendix 5I.

5.1.3.2 Aggregate Sieve Analysis

Sieve analyses were performed at each quarry at regular intervals during production of the aggregate materials to compare the material gradations to the specifications in the FDR. Samples were collected in accordance with ASTM International (ASTM) D75 – Standard Practice for Sampling Aggregates. Intermediate samples were collected as the aggregate materials were being processed and stockpiled, and final samples were collected from blended stockpiles with final material gradations. Results of intermediate and final sampling were used, as necessary, to make real-time adjustments to material processing and stockpiling to ensure compliance with the specifications prior to being shipped to the site.

Sieve analysis was analyzed in accordance with ASTM D422 – Standard Test Method for Particle-Size Analysis of Soils. In 2012, sample collection and sieve analysis were completed at the quarry by Parsons personnel. In addition, a subset of the samples was split and sent to a qualified geotechnical laboratory, Atlantic Testing Laboratories (ATL), to validate Parsons' methods and sampling accuracy for the sieve analyses produced at the quarry. Parsons elected to subcontract all aggregate sample collection and sieve analyses to ATL in subsequent construction seasons (2013 through 2016).

As part of the CQA program, Anchor QEA witnessed more than 10% of the CQC sample collections at the sources. Anchor QEA also performed desktop reviews of particle-size distribution curves and laboratory chemical analysis results, and maintained physical samples of approved materials on site to use for visual comparison to delivered material.

Laboratory reports for the individual sieve analyses performed on aggregate materials are presented in Appendix 5J and tabulated summaries of these results are presented in Appendix 5K.

Table 5-3 contains a summary of the number of final sieve analyses collected for CQC purposes before the aggregate materials were delivered to the project site; samples collected for intermediate and trial blends are not included in this summary. Samples were collected at the source locations at an average frequency of one sample per 964 cy for medium sand, one sample per 1,665 cy for gravelly sand, one sample per 537 cy for fine gravel, one sample per 1,944 cy for Type A coarse gravel, one sample per 2,818 cy for gravelly cobble, and one sample per 711 cy for coarse cobble, exceeding the frequency requirements outlined in Section 5.2.3 of the CQAP (Anchor QEA and Parsons 2012).

Table 5-4 contains a summary of the number of CQA observations made for the final CQC samples collected for sieve analysis. CQA observations were made for 12% of the sieve analyses, satisfying the frequency requirements outlined in Section 5.2 of the CQAP (Anchor QEA and Parsons 2012). The CQA observation frequency for the aggregate material types was 11% for medium sand, 11% for gravelly sand, 14% for fine gravel, 17% for Type A coarse gravel, 14% for gravelly cobble, and 25% for coarse cobble.

5.1.4 Organic Habitat Layer Material

Organic habitat layer material (topsoil) was imported to the lakeshore from multiple sources, as summarized in Table 5-5. Prior to importing topsoil, samples were collected and submitted for laboratory analysis and grain size analysis to compare the material properties of the topsoil to the specifications in the FDR prior to its use.

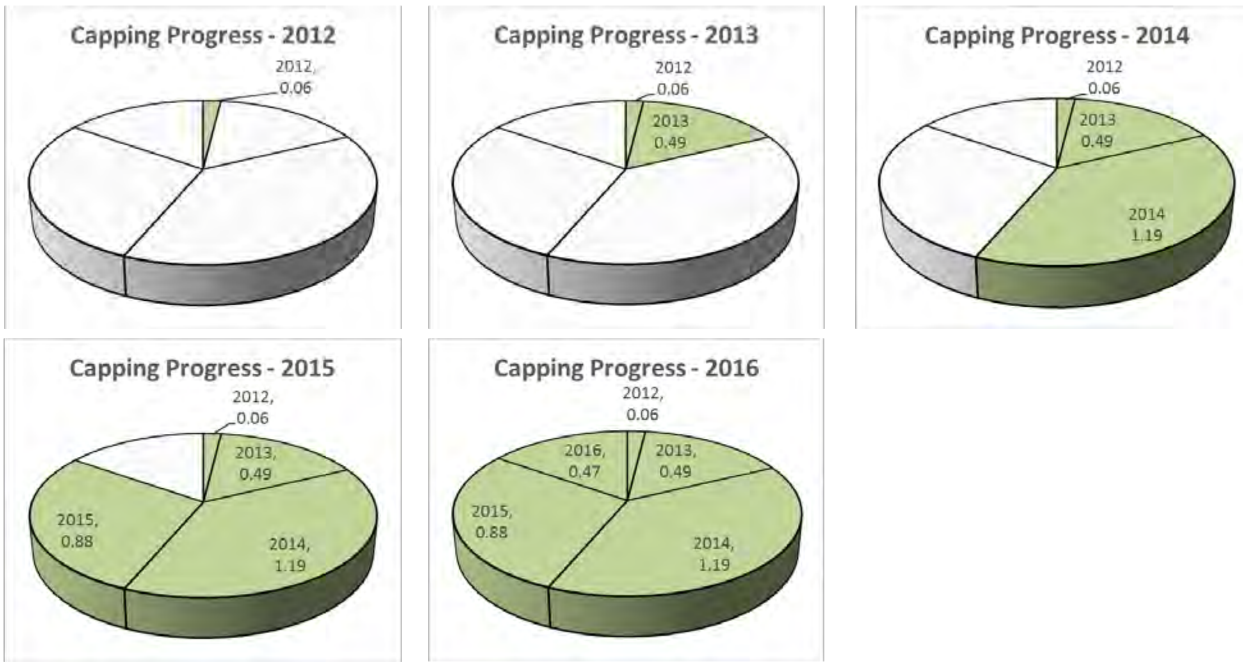
Laboratory analyses were performed using the same procedures used for analysis of aggregates as described in Section 5.1.3.1. The sample collection frequency is summarized in Table 5-6. Laboratory reports for topsoil samples are presented in Appendix 5L, and tabulated summaries of these laboratory results are presented in Appendix 5M. In addition to comparing the analytical results to Unrestricted Use Soil Cleanup Objectives, laboratory samples were analyzed for organic matter content via the Walkley Black method. If laboratory results indicated that the organic matter content was less than that required by the specification (5 to 20%), mulch was added to the topsoil represented by the sample result to raise the organic content of the topsoil above the minimum specified value.

Grain size analyses were also performed via the same procedures used for analysis of aggregates as described in Section 5.1.3.2. The sample collection frequency is summarized in Table 5-7. Laboratory reports for the individual sieve analyses performed on topsoil are presented in Appendix 5N and tabulated summaries of these results are presented in Appendix 5O. Table 5-8 contains a summary of the number of CQA observations made for the final CQC samples collected for sieve analysis.

5.2 Cap Implementation

Cap materials were placed both hydraulically and mechanically. The placement method depended on the grain size of the cap material being placed, the water depth at the placement location, and the proximity to obstructions such as the barrier wall located along the southwest lakeshore. Both placement methods are described in this section. Approximately 3.1 million cy of cap material was placed—1.6 million cy hydraulically and

1.5 million cy mechanically. Capping progress by season is summarized in the following charts.



Season-by-Season Capping Progress
(values in millions of cubic yards)

As many as five separate capping operations were often at work simultaneously; typical hydraulic capping production rates averaged 2,000 to 2,300 cy per day per hydraulic spreader barge, and 1,500 to 1,800 cy per day for mechanical capping operations. During the peak capping season (2014), daily capping rates averaged over 7,000 cy per day, with production rates on several individual days exceeding 10,000 cy.

5.2.1 Hydraulic Capping

A custom hydraulic spreader barge was used for the hydraulic placement of cap material within the lake. The hydraulic spreader barge placed sand-sized materials, including the chemical isolation layers (sand-siderite and sand-GAC) and sand-only layers (un-amended chemical isolation layers, habitat layers, and thin-layer caps). A limited amount of fine gravel was also hydraulically placed in RA-A in December 2014.

Hydraulic Spreader Barge

Similar to the dredging equipment, the hydraulic spreader barge that was used on Onondaga Lake included state-of-the-art controls, monitoring, and tracking equipment that provided an advanced level of positioning data and placement tracking as described in Section 5.1 of the CQAP (Anchor QEA and Parsons 2012). Sevenson used DREDGEPACK software to transmit RTK-GPS information to a custom control box programmed by the equipment supplier, DSC. The control box enabled the hydraulic spreader barge operator to control essential capping parameters such as barge speed and location. The speed and location were adjusted using a winch system that maneuvered the hydraulic spreader barge on cables that were connected to anchors positioned off the four corners of the hydraulic spreader barge. The hydraulic spreader barge could cap individual lanes up to 330 feet long and 22 feet wide, and could cover an area approximately 1.5 acres in size before the anchors were picked up and moved to a new location. Work progress was monitored and documented throughout construction, including location, speed, and quantity of aggregate and amendment placed.

To deliver sand to the hydraulic spreader barge, the contractor generated a slurry of sand and water and pumped the sand-water slurry to the hydraulic spreader barge. Sand was imported to the lakeshore area from multiple quarries (see Section 5.1.3) and stockpiled near equipment located on shore. Sand was loaded into a feed hopper using a PC350LC excavator, continuously weighed using a gravimetric weigh belt feeder with a reported accuracy of ± 2 to 5%, and transported by conveyor from the feed hopper to a slurry mix tank. The typical sand feed rate was 250 to 300 tons per hour. Lake water was pumped into the slurry mix tank, typically at a rate from 5,000 to 6,000 gallons per minute, from a makeup water pump positioned on a modular barge located offshore adjacent to the land-based cap mixing operation. A booster pump then transported the sand and water slurry from the slurry mix tank through a 16-inch, HDPE slurry transport line to the hydraulic spreader barge.

Sand Conveyor

Slurry Mix Tank

Once the slurry reached the hydraulic spreader barge, the cap material was discharged off a 22-foot-wide steel spreader plate positioned at the bow of the hydraulic spreader barge and located approximately 3 feet above the water surface. To place a cap layer at the appropriate location, the hydraulic spreader barge traversed pre-designated capping lanes that were uploaded to the RTK-GPS controls on the hydraulic spreader barge.

Siderite Conveyor

GAC Mix Tanks

For the chemical isolation layers, siderite or GAC was added to the sand-water slurry at the required dose as appropriate. For sand-siderite capping, siderite was added to the slurry mix tank by using a separate feed hopper and conveyor system positioned parallel to the sand hopper and conveyor, also with a reported accuracy of ± 2 to 5%. Siderite feed rates were controlled using a gravimetric weigh belt feeder, similar to the parallel feeder system used to control the rate of sand addition to the slurry.

For sand-GAC layers, a slurry of GAC and water was prepared and stored in four GAC mix tanks; these tanks provided sufficient storage capacity to supply GAC-water slurry to capping operations while also providing adequate soaking time for the GAC in water for the tanks not in active use. To prepare the GAC-water slurry, truck deliveries containing approximately 40,000 pounds of GAC were pneumatically emptied into a GAC mix tank that was filled with a known quantity of water, to prepare a GAC-water slurry of a known concentration; 2 pounds of GAC per gallon of water was a typical operating concentration. Each mix tank contained a dual-paddle system to stir the GAC-water slurry and keep the GAC from settling in the mix tank. The GAC-water slurry was mixed for a minimum of 24 hours to pre-soak (hydrate) the GAC before it was used in the hydraulic capping operation.

After the GAC had been delivered and pre-soaked in the GAC mix tanks, the GAC-water slurry was pumped from the active GAC mix tank to the slurry mix tank using peristaltic metering pumps. The sand-GAC cap slurry was then pumped from the slurry mix tank out to the hydraulic spreader barge. To control the rate of GAC addition, a GAC slurry density flow meter was used during the 2013 through 2016 construction seasons to provide real-time analysis of the GAC content in the slurry. The reported accuracy of the slurry density meter was ± 3 to 5%. Samples of the GAC-water slurry were periodically collected for laboratory analysis, providing a confirmatory measurement of the GAC content of the slurry. The GAC slurry density flow meter was not operational in 2012; therefore, for that season, the GAC content of the slurry relied solely on collecting samples of the slurry for laboratory analysis.

The delivery system for the hydraulic capping operation was monitored continuously, either using a supervisory control and data acquisition (SCADA) system or manual recordings collected by system operators. The SCADA system collected and recorded data for the rates of placement for the sand, siderite, and GAC at 1-minute intervals. The SCADA information allowed real-time system adjustments so that the required mix ratios were maintained, design objectives were achieved, and hydraulic cap placement rates were recorded. When the SCADA system was not in use, such as during the 2012 construction season when technical difficulties prevented its use, capping system performance data were manually recorded and monitored by system operators in real time through monitoring equipment and feed rate displays.

5.2.2 Mechanical Capping

A variety of mechanical placement methods were used for placing gravel materials and topsoil. Sand-containing layers were also placed mechanically in nearshore areas not accessible by the hydraulic spreader barge.

For chemical isolation layer materials placed mechanically in nearshore areas, sand-siderite and sand-GAC were mixed on shore in the cap material stockpile area using bulldozers, front-end loaders, and excavators. Individual stockpiled materials (i.e., sand and siderite, or sand and GAC) were mixed at the appropriate ratios to develop the amendment concentrations required by the FDR. To verify that the necessary amendment (siderite or GAC) was present in the blended stockpile before the stockpile was mechanically placed in the cap, the stockpile of blended material was tested for siderite or GAC content as appropriate using the procedures outlined in Section 5.3.2.1.

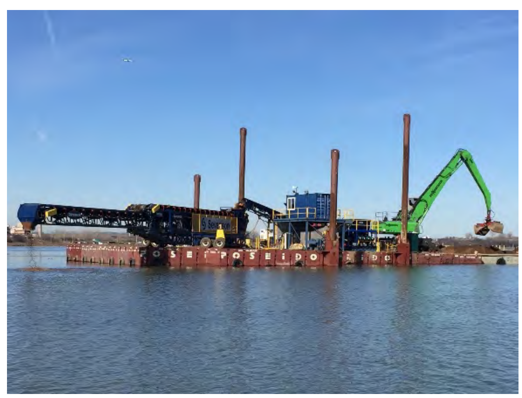
Mechanical capping activities were conducted using three distinct techniques. Primarily, mechanical capping activities were conducted from equipment staged on the lake on modular barges. Equipment was also staged along the shoreline to place cap materials in nearshore areas with insufficient draft that prevented access to the area via barge-mounted equipment. In addition, topsoil was placed in shallow-water areas using conventional earth-moving equipment positioned on HDPE mats. A brief description of each of these techniques follows.

For mechanical capping using lake-based equipment, cap materials were loaded onto transport scows with a loading capacity up to 400 tons and pushed using support vessels to the location of mechanical capping operations. Several excavators mounted on modular barges were utilized to place cap material in the lake, including a 345D excavator with a 2.25-cy clamshell bucket from 2012 through August 15, 2013, a Sennebogen 850 material handler with a 3-cy clam shell bucket after August 15, 2013, and a PC800LC excavator with a 3-cy clamshell bucket after August 1, 2014. Beginning on May 18, 2015, a telestacker unit was placed in service; the telestacker was a conveyor-based system used to place cap materials in both nearshore and outboard areas. On the telestacker barge, a Sennebogen 850 material handler placed material into a feed hopper, which fed the cap material onto a dual conveyor belt that placed the material in the lake. The conveyor belt could be extended up to 120 feet from the modular barge upon which it was positioned. The feed hopper and conveyor belts used RTK-GPS technology and customized Hypack code to feed the conveyor belt with a specific volume of material based on target cap thickness, and place that volume of material at a precise location in the lake as identified using RTK-GPS.

345D Excavator

Sennebogen 850 Material Handler

PC800LC Excavator



Telestacker

Shore-based mechanical capping was conducted using an excavator or telebelt positioned along the shoreline adjacent to the area being capped. Off-road dump trucks transported cap materials to the shore-based equipment, which subsequently placed the materials into the lake. Several shore-based pieces of equipment were used to place cap materials to the required thickness, including a PC220LC excavator, PC300LC excavator, CAT345D excavator, and telebelt. Most mechanical capping equipment was outfitted with RTK-GPS to guide material placement; for instances where the equipment operator did not have access to

RTK-GPS controls (e.g., telebelt operations), a QC surveyor accompanied the mechanical capping activity and provided guidance to the mechanical capping operator.

Capping from Shore – 345D Excavator

Telebelt Capping

HDPE mat roads were also utilized to place cap materials, primarily topsoil, in shallow-water areas where draft restrictions made the area difficult to access using either barge-based or shore-based capping operations. An excavator (CAT 320E or Komatsu 240LC) was positioned on the HDPE mat road, where it placed topsoil or other cap material into the lake. Low-ground pressure dump trucks (Morooka trucks) were used to transport material from onshore stockpiles to the excavator along the HDPE mat road. The HDPE mat road extended into the lake up to 1,200 feet from the shoreline.

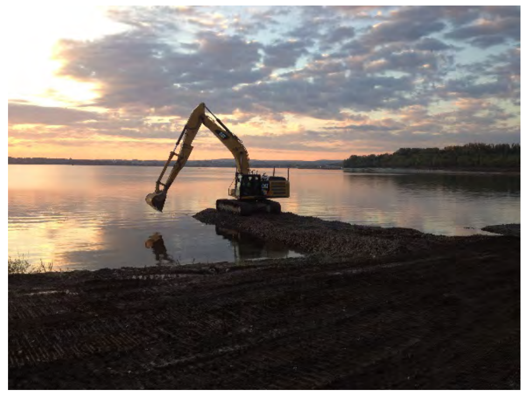
HDPE Mat Road and Truck Delivery of Topsoil

Topsoil Placement Using HDPE Mat Road

From January to April 2014 and September to November 2014, shoreline stabilization at Wastebeds 1 to 8 (see Section 2.3) was completed using land-based mechanical placement.

Morooka trucks were used to transport gravel to excavators that subsequently placed the gravel. Because portions of the shoreline stabilization area extended into the lake, the gravel was used to construct a temporary land bridge to access these portions of the placement area. The gravel from the land bridge was then side-cast into the placement area to complete the shoreline stabilization placement.

Delivery of Gravel for Shoreline Stabilization



Shoreline Stabilization Placement

5.3 Cap Placement Verification

This section presents verification measurements that were performed prior to and following cap placement to demonstrate that the caps were placed to the vertical and horizontal limits and extents required by the design, and that chemical isolation layer amendment dose (where applicable) and final habitat elevation objectives were obtained. The verification measurements were collected in accordance with the requirements outlined in Section 5.3 of the CQAP (Anchor QEA and Parsons 2012).

Verification of the completion of the sediment cap was performed on a CMU basis that divided the lake into smaller areas used to verify completion. Each of the RAs of the lake were subdivided into smaller capping areas, or CMUs, categorized by cap type. CMUs usually ranged from approximately 2 to 10 acres in size; smaller CMUs were sometimes designated based on cap types and specific site conditions.

CMUs were used to assess compliance with required thicknesses for the individual cap layers and cap amendments where appropriate. In addition, CMUs were used for assessing post-construction surface elevations and compliance with habitat objectives.

5.3.1 Cap Thickness Verification

The CQC program included measuring the thickness of each layer of the cap to verify that the required thickness was achieved.

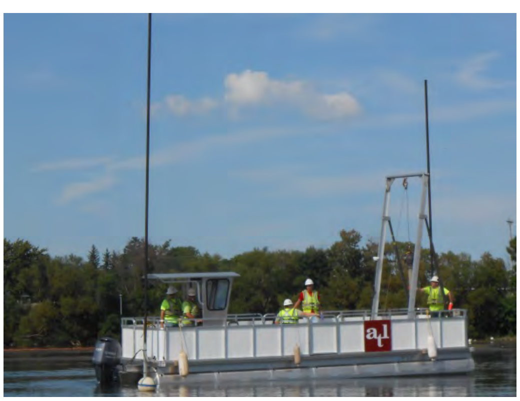
5.3.1.1 Cap Thickness Verification Quality Control

Methods used for cap layer thickness verification included the following:

- Core samples (push cores, gravity cores, and vibracores)
- Catch pans (retrieval and measurement of the cap material retained by the catch pan)
- Survey data collection prior to and after the placement of a cap layer

Gravity Core Retrieval

Catch Pan Retrieval



Vibracore Retrieval

Pole Surveying

The specific method and measurement technique used to verify engineered cap placement was dependent on a number of factors including the particle size of the cap layer being measured, the water depth at the measurement location, the total cap thickness being measured, the physical characteristics of the cap layer being verified, and whether samples of the layer being measured needed to be retained for laboratory analysis.

Gravity cores were the primary method for measuring cap thickness for sand-sized cap layers (i.e., sand-siderite layer, sand-GAC layer, and sand-only habitat layers), up to a total cap thickness of approximately 30 to 36 inches. Vibracore samples were used to measure cap thickness in gravelly sand and fine gravel layers, and also if the cap thickness of sand layers was greater than 30 to 36 inches. Push cores were collected on a limited basis in shallow-water areas. Catch pans were used initially but were not used after November 2013 because field experience indicated that gravity coring and vibracoring were more effective measurement techniques (see Capping FCFs 007, 012, and 015 in Appendix 2B). Survey data collection was the primary method for measuring cap thickness for cap layers consisting of gravel-sized materials and shallow-water areas inaccessible by boat. Survey data to verify cap thickness was generally collected along tracklines spaced 15 feet apart in one direction (see Capping FCF 013 in Appendix 2B).

Gravity Core

Vibracore

Catch Pan

As outlined in Section 5.3 of the CQAP (Anchor QEA and Parsons 2012), cap thickness verification was completed at the following frequency:

- Calibration phase: three to five sample locations per hydraulic capping lane
- Phase 1: eight sample locations per acre
- Phase 2: four sample locations per acre of the chemical isolation layer over an area sufficient to prove out the accuracy of the means, methods, and controls employed

At the initiation of hydraulic capping operations in 2012, measurements were collected at the calibration phase frequency until five consecutive capping lanes met required thickness (and dose) parameters. After approval was given by NYSDEC to end the calibration phase in August 2012, measurements were then collected at the Phase 1 frequency. Phase 1 frequency was used almost exclusively thereafter for the remainder of the cap verification, with one exception. In 2015, Phase 2 frequency was used on a limited basis to analyze the GAC content of sand-GAC samples collected in portions of RA-C, the WBB/HB Outboard Area, and RA-E where the target GAC dose was low (0.02 pound per square foot or less).

5.3.1.2 Cap Thickness Verification Quality Assurance

CQA observation of the thickness measurements was completed on a minimum of 10% of samples (or survey measurements) as outlined in the CQAP. In addition, the CQA program included activities to monitor the installation of the erosion protection and habitat layers of the cap, including the following:

- Witnessing the collection of core samples or catch pans collected by the CQC team
- Periodic observation of post-capping CQC surveys
- Periodic collection of additional CQA samples and measurements for thickness verification purposes if deemed necessary
- Tracking of material placement quantities and cap areas

As part of the CQA program, Anchor QEA verified that the required layer thickness was achieved by witnessing at least 10% of the CQC measurements or collecting co-located measurements for at least 10% of the CQC measurements.

In total, Anchor QEA witnessed 25% of the approximately 9,600 catch pans or core samples that were retrieved by the contractor and included in Lane Capping Completion Forms. For survey measurements, Anchor QEA collected 12% of the approximately 18,400 CQC survey measurements collected by the contractor included in Lane Capping Completion Forms.

5.3.2 Chemical Isolation Layer/Cap Amendment Verification

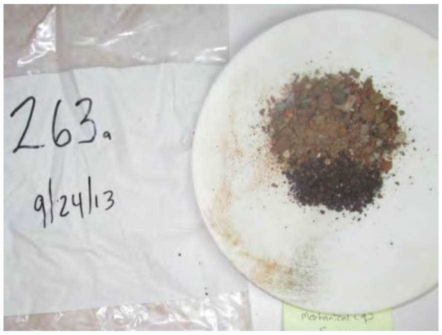
For the chemical isolation layers (layers containing siderite or GAC), catch pan or core samples were used to measure chemical isolation layer thickness. These samples were also retained for laboratory analysis or visually inspected to evaluate amendment doses.

5.3.2.1 Chemical Isolation Layer Quality Control

The contractor provided and implemented a calibrated additive program using the equipment, instrumentation, and data described in Section 5.2.1 as the primary delivery and CQC method of verification that the required siderite and GAC content and distribution were achieved in the chemical isolation layer. Continuous equipment and data display monitoring allowed real-time system adjustments to be made so that the required mix ratios were maintained and design objectives were achieved.

In addition to the calibrated additive program, the contractor performed supplementary in situ CQC activities to verify and confirm the consistent ability of the onshore capping material mixing methods to achieve the GAC and siderite requirements for the chemical isolation layer specified in the design. Catch pans or core samples collected for the in situ sampling program for layer thickness verification (see Section 5.3.1) were also used to verify the presence of the chemical isolation layer amendment. The in situ analytical program for the chemical isolation layer amendment adhered to the requirements detailed in Section 5.3.1.2 of the CQAP (Anchor QEA and Parsons 2012) and field changes summarized in Capping FCF 003 (Appendix 2B).

As described in Capping FCF 003, composite samples from the sand-siderite layer were dried, sieved to retain the medium-size fraction of the sample, and heated to 480°C for 30 minutes to magnetize the siderite particles. The sample was cooled, and magnets were passed over the sample to collect the magnetized siderite particles. The particles collected by the magnet were compared to the non-magnetized particles in the sample, and visual observation was used to verify the presence of siderite, which turns a darker color after heating to 480°C.



Siderite Verification Sample

Composite samples from the sand-GAC layer were analyzed using a thermal process to measure the GAC content of each sample. The samples were sieved to remove particle sizes larger and smaller than the expected GAC particles, heated to 110°C to remove water from the sample, weighed, heated to 500°C to remove GAC from the sample, and weighed again. The difference in weight after heating to 110°C and 500°C represented the total quantity of carbon in the sample. Samples of the aggregate material were also analyzed in this manner to develop a correction factor to account for the minimal amount of naturally occurring organic carbon in the aggregate, and the correction factor was subtracted from the carbon measurement of the composite sample to arrive at the quantity of GAC in the sample.

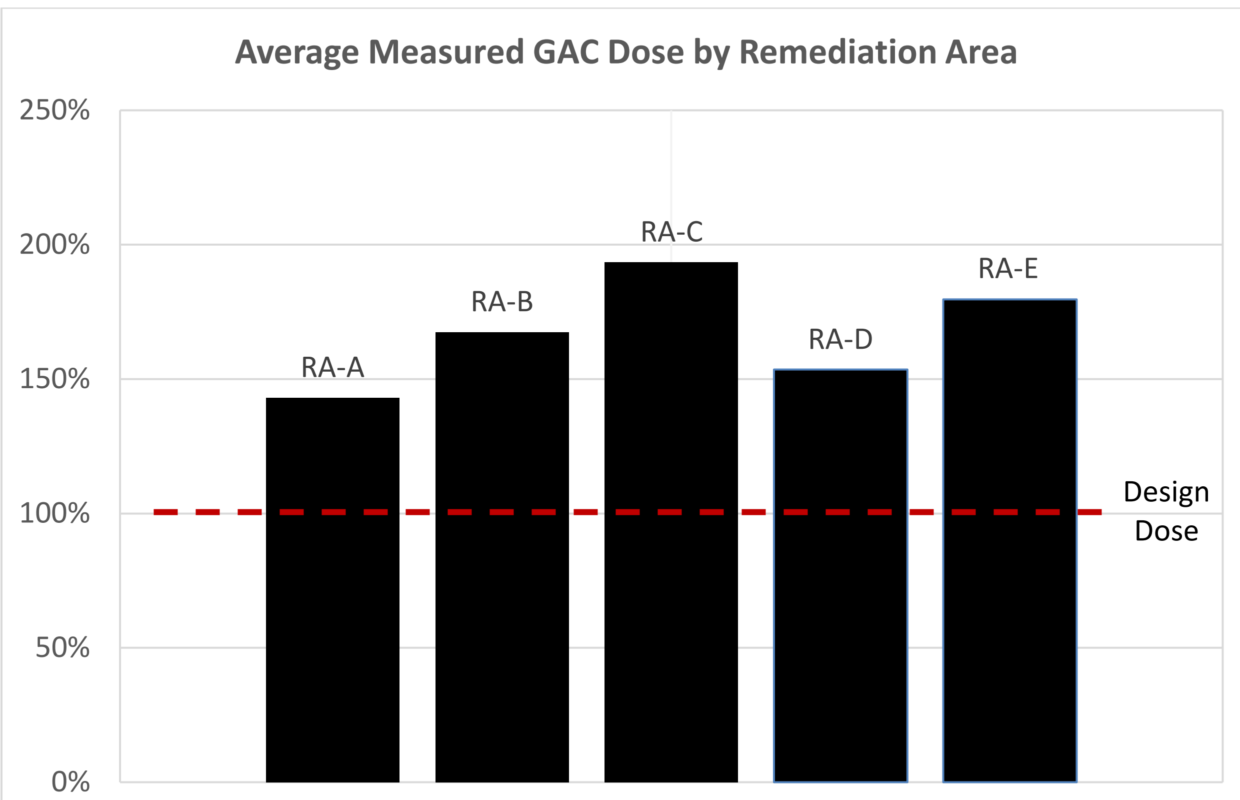
Beginning in 2015, an extra step was added to the GAC analysis procedure; this step was introduced to provide better laboratory measurement of applied GAC versus naturally occurring carbon for areas where active cap placement through the sand-GAC layer spanned multiple years. Samples were heated sequentially to three temperatures: 110°C (to dry it), 400°C (to burn the naturally occurring organic carbon), and 625°C (to burn the GAC). The total quantity of GAC in the sample was measured as the difference in sample weight between the post-400°C and post-625°C heating.

The sand-GAC layer was considered complete within a given area when the following criteria were met (see Section 5.3.3 of the CQAP [Anchor QEA and Parsons 2012]):

- The sand-GAC layer minimum thickness has been met in at least 90% of the in situ thickness measurements, and the remaining measurements are 90% or greater of the design target thickness.

- The GAC application doses have been met in at least 90% of the measurements based on GAC mass application dose monitoring and analysis of catch pan samples, and the application doses within the remaining measurements are 90% or greater of the design target.

To meet these criteria, the sand-GAC layer was placed with a GAC content above the minimum target dose. As a result, the in situ GAC content measured from catch pan and core samples achieved an average concentration well above the minimum GAC concentration required by the design. As depicted in the following chart, for each cap area, the actual in situ GAC concentration measured in samples collected from the placed cap was well above the minimum required GAC concentration for that model area. In most cases, the in situ GAC concentration averaged more than 30% higher than the design GAC concentration.



Average Measured GAC Dose as a Percent of the Design Dose

(Note: Excludes areas with a GAC dose less than the minimum practical dose of 0.1 pound per square foot, where the overdosing was significantly higher.)

5.3.2.2 Chemical Isolation Layer Quality Assurance

In addition to aiding in the execution of the in situ analytical program, Anchor QEA performed CQA activities to verify that the installation and composition of the amended materials were in compliance with the design requirements. As part of the CQA program, Anchor QEA verified that the required layer thickness for the chemical isolation layer was achieved through witnessing at least 10% of the contractor's collection of CQC measurements. If Anchor QEA was unavailable to witness CQC sample collections, or if an additional verification was warranted in the field, Anchor QEA collected independent CQA samples at an interval between 10 and 15% of the total of CQC samples using core samples or other suitable methods. In total, Anchor QEA observed 24% of the approximately 6,000 catch pans or core samples that were retrieved by the contractor for amendment measurement and included in Lane Capping Completion Forms.

Additional tasks performed by Anchor QEA to monitor whether the required GAC and/or siderite content and distribution were achieved included the following:

- Periodic monitoring of land-based cap material mixing operations, instrument readings, and data summary reports for conformance with operation parameters
- Performance of desktop reviews of laboratory results
- Periodic visual observations of materials

5.3.3 Habitat Layer Verification

Upon completion of the final cap layer in an area (following habitat layer placement), achievement of the specified final habitat elevation objectives was confirmed by surveying of the post-cap placement surface. Survey data were used to verify that target elevations and the horizontal limits and extents of capping required by the FDR were achieved.

The specific survey technique used to verify target elevations was dependent on the characteristics of the habitat layer, including the type of material that the final cap layer was composed of, the water depth at the measurement location, and the ability to access the area via boat. For areas with sufficient water depth, bathymetric survey data were collected along track lines spaced 15 feet apart. If the survey area was characterized by a bottom slope, the track lines were oriented perpendicular to the slope. Pole survey measurements were used in nearshore areas and for habitat layers constructed using large gravels.

The target post-capping elevation and allowable variances were developed in the FDR based on the target habitat modules. Allowable variances were outlined in Section 5.3.3 of the CQAP (Anchor QEA and Parsons 2012), and are summarized as follows:

- The tolerance for areas with post-capping water depths less than 2 feet was +0 to -1 foot in at least 90% of the area, and within +0 to -1.5 feet in the remaining 10% of the area.
- The tolerance for areas with post-capping water depths between 2 and 7 feet was +1 to -1 foot in at least 90% of the area, and within +1 to -1.5 feet in the remaining 10% of the area.
- The tolerance for areas with post-capping water depths greater than 7 feet was +2 to -2.5 foot in at least 90% of the area, and within +2.5 to -3 feet in the remaining 10% of the area; these tolerances for areas in water depths greater than 7 feet were summarized in Capping FCF 028 (Appendix 2B).
- For adjacent wetland areas, such as the Wastebeds 1 to 8 connected wetlands and the WBB/HB Outboard Area, the tolerance was +0.5 to -0.5 foot in at least 90% of the area, and within +1 to -1 foot in the remaining 10% of the area.
- For the wetland areas in and adjacent to RA-A, the tolerance was +0.5 to -1 foot in habitat modules 4A1, 4A2, and 5A3, +0 to -1 foot in habitat module 6A1, and +0.75 to -0.75 foot in habitat modules 6A2 and 6A3, as approved in an e-mail from NYSDEC dated September 1, 2015.

5.3.4 Shoreline Stabilization Verification

From January to April 2014 and September to November 2014, shoreline stabilization at Wastebeds 1 to 8 (see Section 2.3) was completed using land-based mechanical placement. This work was completed in accordance with the FDR and the elevation limits specified in Capping FCF 010 (Appendix 2B). The shoreline stabilization cover consisted of a 6-inch coarse gravel layer from elevation 360 feet NAVD88 to 10 feet inland from elevation 362.5 feet NAVD88, and a graded gravel layer up to 18 inches thick from elevation 362.5 to 366.5 feet NAVD88.

The thicknesses of the shoreline stabilization cover layers were recorded using point survey measurements prior to and after the placement of a cover layer. Interim measurements were collected by a CAT 336E excavator outfitted with RTK-GPS controls as it placed the shoreline stabilization material to guide the material placement. The interim measurements were collected on an 8-foot by 8-foot grid spacing, and the CQC team calibrated the RTK-GPS daily. The final layer thickness was confirmed via a CQC survey that collected survey measurements on 50-foot by 50-foot grid spacing.
CQA pole survey data were collected on a subset (approximately 10%) of the CQC survey measurements. In addition, on a weekly basis, the CQA team observed the CQC team confirm the accuracy of the RTK-GPS on the excavator.

5.3.5 Post-Capping Completion Forms

Verification and documentation of cap placement was completed in two steps. The first step was to document the completion of capping within a portion of a single cap layer; this single-layer verification was documented in Lane Capping Completion Forms. The second step was to document the completion of capping for the full-thickness cap composed of multiple layers. A CMU Completion Form was used to document the completion of the full-thickness cap within a CMU. The CMU Completion Form contained summaries of all the Lane Capping Completion Forms that pertained to the CMU and a survey of the habitat layer elevation.

Figures 5-1 through 5-6 (for RA-A through RA-F, respectively) and Figure 5-7 (for the Shoreline Stabilization Area) indicate the areas where capping was completed; the completion of capping was defined as an area for which a CMU Completion Form has been approved.

5.3.5.1 Lane Capping Completion Forms

The criteria outlined in Section 5.3.3 of the CQAP (Anchor QEA and Parsons 2012) were used to assess the completeness of a cap layer. Thickness measurements and (if necessary) chemical isolation layer amendment dose measurements were collected to verify that a set of capping lanes had achieved the required thickness and (if necessary) chemical isolation layer dose.

If the CQC and CQA measurements collected in accordance with Section 5.3 of the CQAP indicated that a set of capping lanes within a capping layer was complete for both layer thickness and chemical isolation layer dose requirements (if necessary), a Lane Capping Completion Form was completed for this set of capping lanes within a single cap layer. The Lane Capping Completion Form documented both the capping completed in the lanes and the data collected to verify that the appropriate thickness and dose were achieved.
The cover sheet for each Lane Capping Completion Form contained the following:

- Form number
- Form originator
- RA
- CMU(s) active
- Capping lanes completed
- Layer description
- Checklist of included supporting documentation/comments
- Approval signatures from representatives of the following parties:
  - Contractor's Representative (Sevenson)
  - Project Engineer (Parsons)
  - CQA Manager (Anchor QEA)
  - Lake Program Manager (Honeywell)
  - Regulatory agency (NYSDEC)

Information contained within the supporting documentation for each Lane Capping Completion Form included but was not limited to the following:

- Designation of cap materials used by layer within the CMU
- Frequency of QC measurements
- Measurement locations and thicknesses
- Capping placement logs
- Calculated volume of material placed
- Measured dosage and volume/mass of chemical isolation layer material (i.e., siderite or GAC)
- Test results for chemical isolation layer dose verification

- Vertical and horizontal limits and extents of capping
- Capping lanes completed and, if necessary, final cap elevations (displayed as a map)

Honeywell coordinated closely with NYSDEC during capping operations to document that the post-capping completion metrics for each layer were achieved prior to initiating placement of subsequent cap layers.

Table 5-9 contains a summary of the Lane Capping Completion Forms submitted and approved during capping operations. Appendix 5P presents the Lane Capping Completion Forms for approved capping.

5.3.5.2 Cap Management Unit Completion Forms

After all cap layers within a CMU were completed and documented by Lane Capping Completion Forms, certification that capping was completed within that CMU was documented in a CMU Completion Form. Each CMU Completion Form was composed of the following:

- Cover sheets that contained the following general CMU information:
  - Form number
  - Form originator
  - RA
  - CMU designation
  - Size of CMU
  - Dates of initiation and completion of capping within the CMU
  - Comments
  - Approval signatures from representatives of the following parties:
    - Contractor's Representative (Sevenson or Parsons)
    - Project Engineer (Parsons)
    - CQA Manager (Anchor QEA)
    - Lake Program Manager (Honeywell)
    - Regulatory agency (NYSDEC)

- Supporting documentation, which consisted of the completed Lane Capping Completion Forms for each cap layer within the relevant CMU

Table 5-10 contains a summary of CMU Completion Forms submitted and approved during capping operations. Appendix 5Q presents the CMU Completion Forms for approved capping work, and Appendix 5R presents as-built drawings of the constructed capping work. Appendix 5S presents the post-cap final bathymetry of the constructed capping work; this bathymetry for each remediation area was compiled from the final post-cap surveys for each individual CMU that were completed as described in Section 5.3.3.

6 WATER QUALITY MONITORING

Water quality monitoring was performed in accordance with the WQMMP (Anchor QEA 2012) to confirm that water quality protection measures were effective. The water quality monitoring program included turbidity monitoring, which consisted of continuous monitoring at stationary locations and limited monitoring at discrete locations with a handheld device, and discrete water column sampling for chemical analysis. Results of the water quality monitoring performed during the capping and dredging were summarized in annual reports. The annual water quality monitoring reports for the 2012 through 2015 construction seasons were previously submitted to NYSDEC; these reports and the report for the final construction season (2016) are included in Appendix 6A.

Turbidity Monitoring Buoy

Discrete Water Column Sample Collection

Turbidity monitoring stations were classified as either performance monitoring stations or compliance monitoring stations. Performance monitoring stations were positioned approximately 200 feet from the edge of the turbidity control structure (i.e., silt curtain) during dredging, or approximately 200 feet from the work area demarcation system during capping activities. The intent of the performance monitoring stations was to monitor near-field turbidity near the construction area and provide an “early warning” of potential water quality impacts.

Compliance monitoring stations served as the official compliance locations for assessing water quality associated with remedial construction activities. The compliance monitoring stations were located approximately 500 feet from the edge of the turbidity control structures during dredging, or approximately 500 feet from the demarcation system during capping activities.

Periodically, the turbidity monitoring stations were positioned at distances greater than 200 feet (for performance monitoring stations) or 500 feet (for compliance monitoring stations) from the edge of the turbidity control structure to avoid interference with construction operations, primarily the location of dredging or capping tailpipes and barge anchor lines. For such deviations from the distances prescribed by the WQMMP, NYSDEC was notified and concurrence was obtained prior to relocating the buoy(s) in question.

Periodic turbidity measurements higher than alert levels were observed at performance monitoring locations positioned around hydraulic and mechanical capping operations. Measurements above the alert level were caused by either clean, imported sand from the hydraulic or mechanical capping operations, meteorological influences such as proximity of turbidity monitoring locations to tributary inflows, precipitation, and wind, or from erroneous measurements caused by either particulate growth on the sonde or a malfunction of the monitoring station equipment.

Three action level turbidity exceedances were recorded while monitoring capping activities. Anchor QEA, in coordination with NYSDEC, investigated the cause of these exceedances. None were determined to be the result of the remedial construction activities, as summarized below. The first action level exceedance occurred at RA-E compliance monitoring station OL-SW-CM-C020 during the night on July 2, 2013. An investigation of this exceedance found it to be the result of turbidity originating from Onondaga Creek following a rain event rather than from dredging or capping operations. The second action level exceedance occurred at RA-D and RA-E compliance monitoring station OL-SW-CM-041 on May 12, 2015. An investigation of this exceedance concluded that the elevated turbidity was a result of increased turbidity from Onondaga Creek following a precipitation event as well. Anchor QEA continued to monitor Onondaga Creek and the area of the lake impacted by the tributary inflow until the elevated turbidity subsided. The third action level exceedance occurred at RA-A compliance monitoring station OL-SW-CM-C047 from September 1 to September 2, 2015. An investigation of this exceedance concluded that the elevated turbidity was from erroneous measurements caused by particulate growth on the turbidity probe.

No turbidity resulting from a disturbance of the underlying sediments was observed during capping operations. Turbidity monitoring for dredging operations indicated there were no exceedances of action levels at locations positioned around dredging operations. Periodic turbidity measurements higher than alert levels observed around dredging operations were attributed to meteorological influences such as proximity to tributary inflows, precipitation, wind, or proximity to capping operations.

All analytical results for discrete water column samples collected at compliance monitoring locations outside the dredging operations were below applicable New York State Aquatic (Acute) Class B/C Surface Water Quality Standards.

7 SUMMARY

Completion of the dredging and capping at Onondaga Lake represents the completion of a major component of one of the largest restoration projects in North America. Approximately 2.15 million cy of dredged material was removed from the lake bottom from July 2012 through October 2014, and pumped over 4 miles to the upland SCA. The material was placed within 979 geotextile tubes, placed up to five layers high, over the 55-acre SCA. From 2012 through 2016, approximately 3.1 million cy of cap material was placed across 475 acres of the lake bottom. The installed cap was designed for an effective life span of 1,000 years, and was constructed of varying types of single-layer and multi-layer caps using siderite, GAC, sands, gravels, and topsoil.

The dredging and capping activities described in this report are part of an optimized, environmentally protective solution based on sound scientific and engineering principles, designed to achieve long-term habitat restoration and economic benefits to the lake.

One key lesson learned is the value of proactively nurturing partnerships. The NYSDEC was the lead agency during design and construction, and had dedicated personnel working in the field within the same office complex as the construction and engineering teams. This partnership and proximity allowed for robust discussion and timely decision making whenever issues arose in the field that required adaptive management. In addition, partnerships with public organizations increased awareness of and support for the restoration work.

WEDA 2014 Annual Safety Award – Onondaga Lake Project Team

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Table 2-1
Field Change Forms - Dredging

FCF Number	Date Approved	Description
001	11/15/2012	Refined the definition for acceptance criteria for underdredged areas in the ILWD
002	7/31/2013	Additional dredging in three small, isolated areas in SMU 1 totaling approximately 4,500 cubic yards (cy) to remove soft black sediment on relatively steep slopes, thereby enhancing stability during cap placement
003	8/27/2013	Additional dredging in an isolated area in SMU 1 totaling approximately 1,700 cy, to remove soft black sediment on relatively steep slopes, thereby enhancing stability during cap placement
004	9/9/2013	Raised the dredge prism by 18 inches over an 8-acre area in SMU 1 to partially offset previous overdredging in SMU 1, resulting in an overdredge offset volume of approximately 18,000 cy
005	10/9/2013	Modified the dredge prism along the transition between RA-D and RA-E to reduce the slope angle near the top of the slope to enhance stability during cap placement; this revision did not impact the total dredge volume
006	1/9/2014	Mechanical dredging of approximately 40,000 cy of soils from the WBB/HB Outboard Area to address hard material, phragmites root mass, and dredge depth limitations; mechanically excavated soils were managed and placed behind the barrier wall in a manner consistent with the Materials Management, Grading, and Disposal Plan – Wastebed B/Harbor Brook Site (O'Brien and Gere 2013)
007	3/17/2014	Modified the dredge prism along the transition area between RA-A and Ninemile Creek to align the two remedial designs and protect trees, resulting in a dredge volume reduction of approximately 2,000 cy
008	5/29/2014	Modified the dredge prism along the transition area between RA-C and the adjacent area to be addressed as part of the Ditch A remediation to create an improved discharge channel; the modification increased the dredge volume by approximately 300 cy
012	1/16/2014	Modified the alignment of the dredge slurry pipeline to improve accessibility for inspections and maintenance, and to reduce wear by reducing the sweep angle of the pipeline at the discharge to booster pump #3
013	3/27/2014	Modified the dredge prism in the western portion of RA-D to reduce the slope angle in areas characterized by soft sediments to enhance stability during cap placement; the modification increased the dredge volume by approximately 6,000 cy
014	4/30/2014	Modified the dredge prism in RA-A and RA-C to reduce the slope angle in areas characterized by soft sediments on relatively steep slopes to enhance stability during cap placement; the modification increased the dredge volumes by approximately 8,600 cy and 1,100 cy, respectively
015	5/5/2014	Modified the dredge prism in RA-B to reduce the slope angle in areas characterized by soft sediments on relatively steep slopes to enhance stability during cap placement; the modification increased the dredge volume by approximately 8,500 cy

Table 2-2
Field Change Forms - Capping

FCF Number	Date Approved	Description
001	8/15/2012; revised 9/5/2012	Approved medium sand containing up to 75% by weight passing the U.S. No. 10 sieve for use, only in specific portions of the chemical isolation layer
002	8/21/2012	Approved for use the first 600 tons of siderite delivered; the grain size distribution for this material deviated slightly from the specification
003	9/14/2012	Modified the siderite detection procedure used to verify siderite content in the chemical isolation layer from a chemical staining procedure to a heating process followed by magnetic separation
004	9/25/2012	Exempted coarse cap materials (fine gravel and coarser) from chemical analysis, consistent with the exemption from Part 375 chemical analysis as per NYSDEC Division of Environmental Remediation 10, Section 5.4e.5
005	10/26/2012	Approved an approximate 1,800-cy stockpile of rejected and amended Sediment Consolidation Area (SCA) drainage gravel for use as Type A coarse gravel in RA C/CMU 10
006	12/17/2012	Revised the specification for siderite to allow grain size distribution of less than 5% passing the U.S. No. 50 sieve rather than less than 5% passing the U.S. No. 30 sieve
007	3/25/2013	Approved the use of gravity cores for verification of the sand-siderite layer in lieu of catch pans, which was the primary method for verification of the sand-siderite layer during the 2012 construction season
008	8/8/2013	Modified the cap design to include a 25-foot, no-cap buffer around Cultural Resource Anomaly A13 located in the SMU 8 thin layer cap area
009	10/17/2013	Modified all Type B Coarse Gravel (3-inch minus) specified by the approved FDR to use of Type A Coarse Gravel (4-inch minus)
010	1/13/2014	Increased the extent of coarse gravel placement as part of shoreline stabilization adjacent to Wastebeds 1-8 to provide additional protection from erosion due to wave action in the surf zone area
012	1/20/2014	Revised the procedure for measuring the thickness of the uppermost sand layer in areas where the cap included multiple sand layers, by using co-located cores
013	2/5/2014	Documented a procedure for measuring the thickness of a cap layer using global positioning system (GPS) elevation surveys in areas where alternative means (e.g., coring) are not feasible
015	2/7/2014	Documented a procedure for collecting samples for GAC verification using core samples in lieu of catch pan samples
016	2/7/2014	Documented a procedure for using GPS to verify the thickness of shoreline stabilization materials placed in SMU 3 and SMU 4
017	3/7/2014	Documented a reduction in the required siderite ore dosage for the chemical isolation layer, based on a measured purity of the siderite ore of 85.5% by weight compared to the 74% siderite by weight used as the basis for the design
018	3/4/2014	Approved for use in both wetland and non-wetland modules approximately 60,000 tons of topsoil obtained from the Costco site
019	5/9/2014	Documented minor revisions to the cap design to enhance slope stability during cap placement, including a minor reduction of cap thickness over 0.52 acres and an increase in cap thickness over 3.3 acres

Table 2-2
Field Change Forms - Capping

FCF Number	Date Approved	Description
020	9/11/2014	Documented minor revisions to the cap design to enhance slope stability during cap placement, including a minor reduction of cap thickness over 2.53 acres and placement of additional cap material over 0.95 acres in an area outside the required capping area to act as a buttress
022	5/19/2014	Revised the final cap elevations in the WBB/HB Outboard Area by 0.3 feet based on an increase in the baseline lake elevation from 362.5 to 362.8 feet North American Vertical Datum of 1988 (NAVD88) derived from discussion with the New York State Canal Corporation; the additional 0.3 feet elevation was achieved through the placement of additional cap material, whereas the dredge prism remained unchanged
023	6/17/2014	Revised the final cap elevations in the portions of RA-A that will be actively planted by 0.3 feet based an increase in the baseline lake elevation from 362.5 to 362.8 feet NAVD88, similar to FCF 022
024	6/4/2014	Revised the dredge and cap designs to address the remains of four submerged watercraft in RA-E, designated A2-1 through A2-4, that were identified within the Syracuse Maritime Historic District during the 2012/2013 Phase 3 Cultural Resources field investigation
025	9/6/2014	Allowed for the use of medium sand as the lower portion of the chemical isolation layer in RA-E where the FDR designated that the chemical isolation layer would consist of gravelly sand; the total chemical isolation layer thickness remained unchanged and the upper portion of the layer must still consist of a minimum 4.5 inches of gravelly sand
026	9/12/2014	Allowed for the installation of a low-permeability membrane at elevations 362 to 367 feet NAVD88 beneath the cap in the Wastebeds 1-8 connected wetland to reduce migration of water from the lake to the adjacent shoreline groundwater collection system during conditions of elevated lake levels
027	4/22/2015	Incorporated a protective edge into the design for RA-A outboard of the planted area using gravelly cobble
028	1/21/2015	Revised the cap target elevation tolerance in areas where the post-capping water depth is greater than 7 feet; minimum cap thickness requirements for these areas remained unchanged
030	10/31/2014	Retracted FCF 026, based on a post-dredging evaluation of site conditions and elevations for the installed collection trench and the dredge area
031	10/29/2014	Allowed an alternate approach to the construction of the sand-siderite layer in RA-B, Wastebeds 1-8 connected wetlands, and west portion of RA-C to facilitate completion of a portion of the sand-siderite layer partially during the 2014 construction season with the remainder capped during the 2015 season
032	11/11/2014	Extended the shoreline habitat enhancement area adjacent to RA-A to provide improved integration with the Wastebeds 1-8 Interim Remedial Measure shoreline cover system
033	2/18/2015	Approved for use topsoil obtained from the northern portion of the Brewerton Raceway site in Brewerton, NY in both wetland and non-wetland modules
034	3/4/2015	Increased the medium sand specification maximum particle size % passing the #10 sieve from 60% to 65%

Table 2-2
Field Change Forms - Capping

FCF Number	Date Approved	Description
036	4/23/2015	Revised habitat/erosion protection layer in two small areas in RA-A where pre-construction bathymetry measurements (from 2012 or later) differed from the pre-design bathymetry measurements (from 2005) that were used as the basis for the Final Design; where the revised anticipated water depth is less than 3 feet, the upper substrate of the habitat/erosion protection layer was increased from fine gravel to coarse gravel
037	6/23/2015	Revised cap elevation tolerances in non-planting dredge and cap areas of RA-B and RA-C to retain the upper elevation tolerances but eliminate the lower elevation tolerance limits; this change provides an opportunity to enhance habitat value by constructing a cap surface with more variable elevations and greater micro-topography
038	4/23/2015	Modified the shoreline transition detail in RA-B (exclusive of the RA-B connected wetland) and the portion of RA-C located west of the New York State Department of Transportation (NYSDOT) turnaround area to provide improved erosion resistance and a smoother transition to upland areas
039	4/23/2015	Refined the design for the berms located between the RA-B connected wetland and Onondaga Lake; the refined design will incorporate a coarser erosion protection material on the lake-side surface layer to protect the shoreward wetland topsoil and raise top elevation of berm from 364 to 366 feet NAVD88 to provide greater wave protection to the wetland during periods of elevated lake levels
040	6/18/2015	Reduced the minimum thickness of the fine gravel habitat/erosion protection layer from 18 to 12 inches in a portion of cap types B-3A-A, H-2A-B, and H-3A-B to enhance slope stability during cap placement in an area characterized by soft low-strength sediment and relatively steep slopes
042	11/10/2015	Documents QA/QC procedures to be implemented pertaining to the installation of Modified Protective Cap (MPC) RA-B-1 in Remediation Area B; the MPC design is documented separately
045	10/20/2015	Documents QA/QC procedures to be implemented pertaining to the installation of Modified Protective Cap (MPC) RA-D-1 in Remediation Area D and the adjacent amended Thin Layer Cap (TLC); the MPC and TLC revised design is documented separately
048	8/19/2015	Added a 12-inch thick sand buttress, 60 feet wide and 750 feet long, near the bottom of a slope located in the north portion of RA-E to enhance slope stability during cap placement in an area characterized by soft low-strength sediment and relatively steep slopes
049	9/24/2015	Reduced the sand-siderite layer thickness to 3 inches, while maintaining the original design minimum siderite application rate, in an area characterized by soft low-strength sediment and relatively steep slopes in MPC areas RA-B-1A, RA-B-1C, and RA-B-1D
053	1/6/2016	Documents relief from the typical final cap surface elevation compliance criteria required by the CQAP related to a portion of the J-cap in CMU 9 of RA-D totaling 795 square feet located in the vicinity of the diffuser pipe near the RA-D cap disturbance
054	1/6/2016	Installation of a 10-foot-wide layer of clay substrate along the southern excavation face of the shoreline of the RA-B connected wetland (lake side of the WB1-8 shoreline groundwater collection trench). Purpose of the clay layer is to reduce migration of water from the lake to the trench during conditions of elevated lake levels.

Table 2-2
Field Change Forms - Capping

FCF Number	Date Approved	Description
055	3/2/2016	Minor revisions to the RA-A boundary based on the results of sediment samples collected in May 2015, subsequent to the Final Design
056	3/2/2016	Minor revision to the cap design in a small portion of RA-E close to the border with RA-D where soft (low strength) sediment is present on relatively steep slopes. To enhance slope stability during cap placement, this revision reduced the minimum thickness of the gravelly cobble erosion protection layer from 18 inches to 12 inches over a 30-foot wide area covering approximately 0.5 acres.
057	6/6/2016	Revisions to naturalized shoreline design along the western portion of the Willis/Semet barrier wall. Based on slope stability analysis, material placement in a 600-foot long segment was limited to the full thickness cap. In the remaining 250-foot long segment, lightweight fill was incorporated along the barrier wall to facilitate creation of the naturalized shoreline.
058	5/2/2016	Revisions to naturalized shoreline design along the eastern portion of the Willis/Semet barrier wall. Modified the erosion protection layer to an 18-inch minimum coarse cobble layer overlain by a minimum 6-inch fine gravel layer to a water depth of 4 feet. These revisions were made to increase protection from wave action and ice scour; the naturalized shoreline was constructed consistent with the final design.
061	5/4/2016	Documents QA/QC procedures to be implemented pertaining to all Modified Protective Cap (MPC) areas, as well as the Modified Erosion Resistant Cap (MERC) in the vicinity of the Metro deep-water outfall pipe. The MPC and MERC designs are documented in separate Design Revision documents.
062	6/27/2016	Documents various features that will be incorporated into the Wastebed B/Harbor Brook Outboard Area wetlands to increase habitat diversity, increase resilience to wind/wave action, and provide for cap surface elevations that will facilitate wetland vegetation establishment. Additional details on the basis for these revisions is provided in the Wastebed B/Harbor Brook Outboard Area Wetland Optimization Design Addendum.
063	8/4/2016	Incorporated marine armor mattresses (MAMs) into an outfall scour protection apron near a 48-inch diameter stormwater outfall located in RA-D. The cap area associated with the scour protection apron was 1,250 square feet (0.03 acres).
064	8/10/2016	Documents cap elevation acceptance criteria in RA-C in Cap Management Unit (CMU) number 10. The upper cap elevation tolerance remained unchanged, but the lower cap elevation tolerance was eliminated, because lower elevations would support the planned future use of the adjacent shoreline area as a boat launch.
065	7/20/2016	Documents revisions to the gradation specifications for coarse cobble associated with the erosion protection layer along portions of the sloped (naturalized) shoreline along the Willis/Semet barrier wall (see Capping FCFs 057 and 058), as well as the protective edge of the plateaus in the Wastebed B/Harbor Brook Outboard Area (see Capping FCF 062).

Table 4-1
Dredge Management Unit Summary
RA-A

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
A-001	AI-A3	5/9/2014	6/3/2014	5/3/2014	5/3/2014	0.27	856	410	12	
A-002	AI-A4	5/21/2014	6/3/2014	5/3/2014	5/7/2014	2.15	9,302	5,957	12	
A-003	AF-A5	6/3/2014	7/2/2014	5/23/2014	5/24/2014	0.89	3,293	2,009	11	
A-004	AI-A5	6/3/2014	8/6/2014	5/9/2014	5/20/2014	3.17	19,833	16,036	9	
A-005	AJ-A5	6/3/2014	8/6/2014	5/21/2014	5/21/2014	0.01	9	3	9	
A-006	AG-A4	6/18/2014	7/10/2014	5/13/2014	6/14/2014	1.50	10,868	7,851	15	
A-007	AH-A4	6/18/2014	6/25/2014	5/6/2014	5/7/2014	1.46	7,457	5,395	11	
A-008	AH-A5	6/19/2014	6/25/2014	5/8/2014	5/21/2014	4.58	23,682	16,429	12	
A-009	AG-A5	6/19/2014	8/6/2014	5/23/2014	5/30/2014	4.53	34,344	27,251	12	
A-010	AE-A6	6/19/2014	8/7/2014	5/27/2014	5/27/2014	0.16	595	360	11	
A-011	AF-A6	6/19/2014	8/7/2014	5/27/2014	5/27/2014	1.27	5,108	3,139	11	
A-012	AH-A6	6/19/2014	8/7/2014	6/10/2014	6/19/2014	1.32	16,102	12,598	20	Includes upland/nearshore portion of removal: 5,450 square feet
A-013	AI-A6	6/19/2014	8/7/2014	6/19/2014	6/19/2014	0.08	340	220	11	
A-014	AG-A6	6/19/2014	8/7/2014	5/30/2014	6/18/2014	2.01	26,605	21,629	18	
A-015	AA-A5	6/25/2014	6/30/2014	6/21/2014	6/3/2014	0.54	4,619	4,111	7	
A-016	AB-A5	6/25/2014	6/30/2014	5/20/2014	6/3/2014	0.59	4,764	4,546	3	
All DMUs - RA-A						**24.5**	**167,775**	**127,945**	**12**	

Notes:
cy - cubic yards
DMU - Dredge Management Unit
RA - Remediation Area
Volume to Neatline - Volume required to dredge to the design elevations

Table 4-2
Dredge Management Unit Summary
RA-B

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
B-001	BG-B1	10/29/2014	11/3/2014	10/11/2014	10/11/2014	0.02	106	51	17	
B-002	BG-B2	10/29/2014	11/3/2014	10/9/2014	10/15/2014	1.80	12,348	7,805	19	
B-003	BF-B1	10/29/2014	11/3/2014	10/10/2014	10/10/2014	1.13	7,263	5,170	14	
B-004	BF-B2	10/29/2014	11/3/2014	10/11/2014	10/15/2014	2.28	16,553	10,698	19	
B-005	BE-B2	10/29/2014	11/3/2014	10/14/2014	10/29/2014	2.00	19,261	14,645	17	
B-006	BD-B1	10/29/2014	11/3/2014	10/16/2014	10/16/2014	0.0002	0.15	0.15	0	
B-007	BD-B2	10/29/2014	11/3/2014	10/20/2014	10/23/2014	2.05	28,500	24,640	14	
B-008	BC-B2	10/29/2014	11/3/2014	10/24/2014	10/29/2014	1.69	16,939	12,963	18	
B-009	BB-B2	10/29/2014	11/3/2014	10/25/2014	10/29/2014	0.76	5,296	3,198	21	
All DMUs - RA-B						**11.7**	**106,264**	**79,169**	**17**	

Notes:
cy - cubic yards
DMU - Dredge Management Unit
RA - Remediation Area
Volume to Neatline - Volume required to dredge to the design elevations

Table 4-3
Dredge Management Unit Summary
RA-C

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
C-001	CG-C2	8/20/2012	8/22/2012	8/10/2012	8/10/2012	0.07	376	126	25	
C-002	CE-C2	8/21/2012	8/27/2012	7/17/2012	8/7/2012	1.73	16,631	12,330	18	
C-003	CF-C2	8/21/2012	8/27/2012	8/7/2012	8/15/2012	0.40	4,183	2,942	23	
C-004	CH-C2	10/29/2012	11/15/2012	8/10/2012	10/25/2012	0.81	5,202	3,793	13	
C-005	CA-C1	10/9/2014	10/30/2014	6/17/2014	10/4/2014	1.56	9,457	5,525	19	
C-006	CA-C2	10/9/2014	10/30/2014	6/21/2014	10/4/2014	0.004	15	0	27	
C-007	CB-C1	10/9/2014	10/30/2014	6/18/2014	10/7/2014	1.38	6,682	4,047	14	
C-008	CB-C2	10/9/2014	10/30/2014	8/2/2014	10/7/2014	0.07	485	62	43	
C-009	CC-C2	10/10/2014	10/30/2014	6/19/2014	10/8/2014	0.85	5,948	3,714	20	
C-010	CD-C2	10/13/2014	10/30/2014	6/20/2014	10/9/2014	0.20	1,191	660	20	
All DMUs - RA-C						**7.1**	**50,168**	**33,199**	**18**	

Notes:
cy - cubic yards
DMU - Dredge Management Unit
RA - Remediation Area
Volume to Neatline - Volume required to dredge to the design elevations

Table 4-4
Dredge Management Unit Summary
RA-D

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
D-001	DA-D3	11/8/2012	11/14/2012	10/22/2012	11/1/2012	0.43	5,200	4,047	20	
D-002	DA-D4	11/9/2012	11/14/2012	9/15/2012	11/5/2012	1.05	10,174	7,989	15	
D-003	DB-D3	11/15/2012	11/16/2012	8/16/2012	10/31/2012	0.61	4,794	4,183	7	
D-004	DB-D4	11/16/2012	11/16/2012	8/13/2012	11/7/2012	2.88	41,249	37,516	10	
D-005	DC-D3	11/16/2012	11/27/2012	11/10/2012	11/13/2012	0.87	7,015	6,257	6	
D-006	DC-D4 (1)	11/16/2012	11/28/2012	11/11/2012	11/15/2012	1.45	19,820	18,376	7	Includes grids 1, 2, 4, 5, 6, 9, 10, 13, and 14; grids 8 and 12 in DMU D-011
D-007	DD-D3	11/21/2012	11/28/2012	8/27/2012	11/17/2012	3.90	58,192	52,541	11	
D-008	DD-D4 (1)	11/29/2012	11/29/2012	8/27/2012	10/17/2012	0.92	14,984	14,053	8	Includes grids 1 through 4; grids 5 through 12 in DMU D-012
D-009	DE-D2	8/1/2013	8/12/2013	7/17/2013	7/17/2013	0.72	4,889	3,623	13	
D-010	DE-D3	8/1/2013	8/12/2013	9/20/2012	7/18/2013	4.00	54,798	47,471	14	
D-011	DC-D4 (2)	8/9/2013	8/21/2013	7/29/2013	8/1/2013	0.19	525	456	3	Includes grids 8 and 12; grids 1, 2, 4, 5, 6, 9, 10, 13, and 14 in DMU D-006
D-012	DD-D4 (2)	8/9/2013	8/14/2013	8/31/2012	7/31/2013	1.90	26,215	23,846	9	Includes grids 5 through 12; grids 1 through 4 in DMU D-008
D-013	DF-D2	8/9/2013	8/21/2013	5/16/2013	8/6/2013	1.22	7,479	5,441	12	Volume on DMU was 7,459.18 cy; revised to 7,478.97 cy per email from A. Ruta on 11/21/2014
D-014	DG-D1	8/20/2013	8/28/2013	7/13/2013	7/13/2013	0.04	125	19	19	
D-015	DG-D2	8/20/2013	8/29/2013	5/16/2013	7/27/2013	4.44	54,629	50,065	8	
D-016	DE-D4	8/21/2013	8/28/2013	10/18/2012	8/19/2013	2.88	40,577	36,412	11	
D-017	DF-D3	8/24/2013	8/28/2013	4/19/2013	8/22/2013	4.59	51,862	47,211	8	

Table 4-4
Dredge Management Unit Summary
RA-D

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
D-018	DE-D2-R	8/30/2013	9/4/2013	8/27/2013	8/28/2013	0.07	199	138	7	Refinement area at north end of original dredge area
D-019	DE-D3-R	8/30/2013	9/4/2013	8/28/2013	8/29/2013	0.32	1,463	1,190	6	Refinement area at north end of original dredge area
D-020	DF-D4	9/6/2013	9/11/2013	6/12/2013	9/3/2013	2.08	31,328	29,928	5	
D-021	DG-D3	9/11/2013	9/18/2013	5/13/2013	9/9/2013	4.59	51,810	49,279	4	
D-022	DH-D3	9/24/2013	10/22/2013	6/19/2013	9/20/2013	4.59	53,322	49,008	7	
D-023	DH-D2	9/24/2013	10/2/2013	7/15/2013	9/20/2013	4.59	68,321	65,754	4	
D-024	DH-D1	9/24/2013	10/2/2013	8/30/2013	9/23/2013	1.19	10,119	8,507	10	
D-025	DI-D3	10/22/2013	11/12/2013	9/3/2013	10/18/2013	4.59	63,522	60,734	5	
D-026	DI-D1	10/30/2013	11/12/2013	8/29/2013	10/24/2013	3.03	27,381	23,281	10	
D-027	DI-D2	10/30/2013	11/12/2013	9/6/2013	10/21/2013	4.59	73,474	71,253	4	
D-028	DJ-D1	11/19/2013	11/20/2013	9/13/2013	10/25/2013	2.43	23,490	19,835	11	
D-029	DJ-D2	11/19/2013	11/20/2013	9/11/2013	11/8/2013	4.59	85,138	84,080	2	
D-030	DK-D1	11/19/2013	12/9/2013	10/29/2013	10/29/2013	0.10	350	133	17	
D-031	DJ-D3	11/22/2013	11/26/2013	9/24/2013	11/4/2013	4.59	72,653	71,752	1	
D-032	DK-D2	11/22/2013	12/4/2013	11/1/2013	11/14/2013	3.02	42,605	41,751	2	
D-033	DL-D2	11/22/2013	12/9/2013	11/21/2013	11/21/2013	0.002	11	4	26	
D-034	DK-D3 (West)	11/22/2013	12/4/2013	11/11/2013	11/22/2013	2.30	40,253	39,428	3	Includes grids 1, 2, 5, 6, 9, 10, 13, 14, 17, and 18
D-035	DG-D4	4/30/2014	5/12/2014	5/11/2013	4/15/2014	2.96	30,092	25,266	12	
D-036	DI-D4	5/8/2014	5/12/2014	9/20/2013	5/2/2014	3.66	35,025	34,537	1	
D-037	DH-D4	5/15/2014	5/15/2014	8/12/2013	5/2/2014	3.43	33,914	31,537	5	
D-038	DJ-D4	5/15/2014	5/20/2014	9/30/2013	5/9/2014	3.89	41,778	41,308	1	
D-039	DL-D3	10/2/2014	10/22/2014	8/6/2014	9/26/2014	1.32	16,451	15,152	7	
D-040	DK-D3 (East)	10/7/2014	10/22/2014	11/11/2013	9/30/2014	2.30	39,962	39,145	3	Includes grids 3, 4, 7, 8, 11, 12, 15, 16, 19, and 20

Table 4-4
Dredge Management Unit Summary
RA-D

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
D-041	DL-D4	10/8/2014	10/22/2014	9/27/2013	10/4/2014	2.86	32,766	29,795	8	
D-042	DK-D4	10/8/2014	10/22/2014	4/29/2014	10/3/2014	4.03	48,373	45,233	6	
All DMUs - RA-D						**103.2**	**1,326,326**	**1,237,534**	**6**	

Notes:

cy - cubic yards

DMU - Dredge Management Unit

RA - Remediation Area

Volume to Neatline - Volume required to dredge to the design elevations

Table 4-5
Dredge Management Unit Summary
RA-E

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
E-001	EM-E5	7/14/2014	8/4/2014	7/1/2014	7/1/2014	0.06	246	125	15	Interim approval received via e-mail from NYSDEC on 7/27/2014
E-002	EN-E6	7/14/2014	8/4/2014	6/29/2104	7/1/2014	0.67	3,366	2,537	9	Interim approval received via e-mail from NYSDEC on 7/27/2014
E-003	EO-E4	7/23/2014	8/4/2014	7/18/2014	7/18/2014	0.05	171	52	19	Interim approval received via e-mail from NYSDEC on 7/27/2014
E-004	EN-E4	7/23/2014	8/4/2014	7/18/2014	7/18/2014	0.06	243	73	20	Interim approval received via e-mail from NYSDEC on 7/27/2014
E-005	EN-E5	7/23/2014	8/4/2014	7/18/2014	7/18/2014	0.03	87	27	16	Interim approval received via e-mail from NYSDEC on 7/27/2014
E-006	EM-E6	7/28/2014	8/6/2014	6/25/2014	7/21/2014	3.48	17,340	11,992	11	
E-007	EL-E6	7/31/2014	8/6/2014	6/25/2014	7/28/2014	2.71	11,314	7,908	9	
E-008	EK-E6	8/14/2014	8/21/2014	7/8/2014	7/26/2014	2.11	8,409	6,433	7	
E-009	EL-E7	8/19/2014	8/25/2014	6/28/2014	8/15/2014	1.85	11,094	7,343	15	
E-010	EM-E7	8/19/2014	8/26/2014	6/28/2014	8/15/2014	1.63	13,607	10,300	15	
E-011	EN-E7	8/19/2014	8/26/2014	6/28/2014	8/15/2014	0.13	861	583	16	
E-012	EH-E5	8/19/2014	9/11/2014	7/24/2014	7/30/2014	0.18	667	263	17	
E-013	EJ-E6	8/19/2014	8/26/2014	7/15/2014	8/5/2014	1.68	6,370	4,338	9	
E-014	EF-E6	9/2/2014	10/1/2014	8/14/2014	8/16/2014	0.10	312	102	16	
E-015	EF-E7	9/2/2014	10/1/2014	8/13/2014	8/18/2014	4.08	25,614	18,791	12	
E-016	EF-E8	9/2/2014	9/24/2014	8/13/2014	8/15/2014	0.35	2,684	1,732	20	
E-017	EJ-E7	9/2/2014	9/16/2014	8/13/2014	8/25/2014	3.90	28,226	21,805	12	
E-018	EJ-E8	9/2/2014	9/16/2014	8/14/2014	8/14/2014	0.001	3	0	19	

Table 4-5
Dredge Management Unit Summary
RA-E

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
E-019	EC-E6	9/5/2014	10/1/2014	8/22/2014	8/25/2014	0.90	3,766	1,660	17	
E-020	EC-E7	9/5/2014	9/24/2014	8/20/2014	8/25/2014	4.32	26,255	16,260	17	
E-021	EC-E8	9/5/2014	9/24/2014	8/22/2014	8/22/2014	0.02	66	35	15	
E-022	EH-E6	9/8/2014	9/16/2014	7/30/2014	8/27/2014	1.41	13,397	9,519	20	
E-023	EI-E5	9/8/2014	9/11/2014	8/25/2014	8/25/2014	0.19	380	184	8	
E-024	EI-E6	9/8/2014	9/16/2014	7/1/2014	8/26/2014	2.20	18,399	12,998	18	
E-025	EB-E6	9/11/2014	10/7/2014	8/23/2014	9/3/2014	3.85	20,368	10,506	19	
E-026	EG-E6	9/11/2014	9/24/2014	8/11/2014	8/11/2014	0.001	2	1	11	
E-027	EG-E7	9/11/2014	9/24/2014	8/9/2014	8/14/2014	4.02	24,794	17,943	13	
E-028	EG-E8	9/11/2014	10/1/2014	8/13/2014	8/14/2014	0.25	2,011	1,251	23	
E-029	ED-E6	9/12/2014	10/7/2014	8/18/2014	8/19/2014	0.06	165	70	11	
E-030	ED-E7	9/12/2014	10/7/2014	8/16/2014	9/5/2014	4.46	32,168	23,296	15	
E-031	ED-E8	9/12/2014	10/2/2014	8/18/2014	8/19/2014	0.40	3,181	2,010	22	
E-032	EK-E7	9/12/2014	9/18/2014	7/8/2014	8/2/2014	4.48	35,535	26,801	15	
E-033	EK-E8	9/12/2014	9/22/2014	7/12/2014	8/16/2014	0.31	1,147	1,103	1	
E-034	EH-E7	9/12/2014	9/22/2014	7/29/2014	9/4/2014	3.22	29,878	23,187	15	
E-035	EH-E8	9/12/2014	9/24/2014	8/7/2014	9/4/2014	0.21	1,354	874	17	
E-036	EI-E7	9/12/2014	9/22/2014	7/10/2014	9/4/2014	4.18	36,844	30,793	11	
E-037	EI-E8	9/12/2014	9/22/2014	7/24/2014	9/4/2014	0.21	1,427	1,019	15	
E-038	EB-E7	9/15/2014	10/9/2014	8/25/2014	9/3/2014	2.92	19,670	12,303	19	
E-039	EA-E6	10/8/2014	10/16/2014	8/28/2014	9/18/2014	1.97	13,892	9,920	15	
E-040	EA-E7	10/8/2014	10/21/2014	8/28/2014	9/20/2014	0.56	4,763	3,678	14	
E-041	EA-E6-OB	10/8/2014	10/29/2014	9/17/2014	10/4/2014	0.85	8,841	7,685	10	
E-042	EA-E7-OB	10/8/2014	10/29/2014	9/16/2014	10/4/2014	1.69	15,124	14,260	4	

Table 4-5
Dredge Management Unit Summary
RA-E

Form Number	DMU	Date Submitted	Date Approved	Date Dredging Initiated	Date Dredging Completed	Area (acres)	Volume Removed (cy)	Volume to Neatline (cy)	Average Overdredge (inches)	Notes
E-043	EB-E7-OB	10/8/2014	10/29/2014	9/16/2014	9/16/2014	0.00	3	3	-1	Original DMU submittal listed 488.66 cy in error; correct volume 3.12 cy per email from A. Ruta on 11/21/2014
E-044	EZ-E7-OB	10/8/2014	10/29/2014	9/18/2014	9/18/2014	0.20	1,505	1,487	1	
E-045	EZ-E6-OB	10/16/2014	10/29/2014	9/19/2014	10/9/2014	2.51	26,215	23,161	9	
All DMUs - RA E						**68.4**	**471,761**	**346,411**	**14**	

Notes:

cy - cubic yards

DMU - Dredge Management Unit

RA - Remediation Area

Volume to Neatline - Volume required to dredge to the design elevations

Table 5-1
Sources of Imported Backfill

Quarry Name	Company	Location	Medium Sand (Specification)		Medium Sand (FCF-001)		Gravelly Sand		Fine Gravel		Coarse Gravel		Gravelly Cobble		Coarse Cobble		Bank Run		Light Weight Fill		Clay		Total by Quarry	
			cy	tons	cy	tons	cy	tons	cy	tons	cy	tons	(cy)	(tons)	(cy)	(tons)	(cy)	(tons)	(cy)	(tons)	(cy)	(tons)	cy	tons
Amboy	Syracuse Sand & Gravel	Amboy, NY	83,769	125,654	14,969	22,453	--	--	4,771	7,157	--	--	44,334	68,717	13,854	21,473	--	--	--	--	--	--	161,696	245,454
Baldwin Ives	Syracuse Sand & Gravel	Fulton, NY	179,256	268,884	130,514	195,771	175,474	271,984	71,273	106,909	24,182	36,273	22,299	34,564	--	--	--	--	--	--	--	--	602,998	914,385
Elbridge	Grant Perry	Elbridge, NY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4,313	6,685	--	--	--	--	4,313	6,685
Geer (Palermo)	Syracuse Sand & Gravel	Fulton, NY	--	--	12,781	19,171	17,201	26,661	--	--	5,478	8,217	--	--	--	--	--	--	--	--	--	--	35,459	54,049
Granby	Syracuse Sand & Gravel	Granby, NY	278,832	418,248	132,228	198,342	23,614	36,601	128,587	192,881	43,014	64,521	44,255	68,595	--	--	7,005	10,858	--	--	--	--	657,535	990,046
Hannibal	Syracuse Sand & Gravel	Hannibal, NY	25,623	38,434	--	--	19,275	29,876	--	--	33,817	50,726	14,510	22,491	--	--	--	--	--	--	--	--	93,225	141,527
Harris	Syracuse Sand & Gravel	Hannibal, NY	23,615	35,423	--	--	33,685	52,212	9,529	14,294	4,539	6,809	--	--	--	--	--	--	--	--	--	--	71,369	108,738
Hastings	Syracuse Sand & Gravel	Hastings, NY	--	--	--	--	--	--	--	--	8,292	12,438	--	--	--	--	--	--	--	--	--	--	8,292	12,438
Johnny Cake	Syracuse Sand & Gravel	Fulton, NY	--	--	--	--	--	--	--	--	--	--	14,081	21,826	--	--	--	--	--	--	--	--	14,081	21,826
Lake Road	Syracuse Sand & Gravel	Phelps, NY	16,402	24,603	25,791	38,686	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42,193	63,289
Lindsey	Lindsey Aggregates, Inc.	Volney, NY	92,917	139,375	25	38	--	--	41,455	62,183	--	--	--	--	--	--	--	--	--	--	--	--	134,397	201,596
Marcellus	Scott Gutchess	Marcellus, NY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	819	1,665	819	1,665
Mexico	Spicer-Reed Gravel Pit (CJ Forlito)	Mexico, NY	58,090	87,135	--	--	72,061	111,695	20,435	30,653	25,433	38,150	--	--	--	--	--	--	--	--	--	--	176,020	267,633
Nightingale	Nightingale Gravel	Marcellus, NY	95,079	142,619	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	95,079	142,619
Northeast Solite	Northeast Solite Corporation	Mount Marion, NY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,801	1,459	--	--	1,801	1,459
Northern Concrete	Syracuse Sand & Gravel	Fulton, NY	9,729	14,594	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9,729	14,594
Palmyra	Dolomite Palmyra Sand & Gravel	Palmyra, NY	2,489	3,734	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2,489	3,734
Panther Lake	Syracuse Sand & Gravel	Bernhards Bay, NY	238,293	357,440	76,253	114,380	--	--	14,321	21,481	129,033	193,550	140,133	217,206	10,522	16,309	--	--	--	--	--	--	608,556	920,366
Smith	Smith Sand & Gravel	Marietta, NY	154,871	232,307	7,769	11,654	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	162,641	243,961
Stoney Robby	Syracuse Sand & Gravel	Fulton, NY	--	--	23,389	35,084	7,221	11,192	891	1,336	3,827	5,740	--	--	--	--	--	--	--	--	--	--	35,327	53,352
Suit-Kote	Suit-Kote Corp	Cortland, NY	--	--	57,016	85,524	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	57,016	85,524
Wolcott	Syracuse Sand & Gravel	Wolcott, NY	28,505	42,757	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	28,505	42,757
Total by Aggregate Type			**1,287,471**	**1,931,207**	**480,735**	**721,103**	**348,530**	**540,221**	**291,263**	**436,894**	**277,616**	**416,424**	**279,612**	**433,399**	**24,375**	**37,782**	**11,318**	**17,543**	**1,801**	**1,459**	**819**	**1,665**	**3,003,541**	**4,537,697**

Notes:
Unit weight conversions (tons per cubic yard):
Medium sand = 1.5
Fine gravel = 1.5
Type A gravel = 1.5
Gravelly Sand = 1.55
Gravelly Cobble = 1.55
Coarse Cobble = 1.55
Topsoil = 1.5
Light Weight Fill = 0.81
Bank Run = 1.55
Quantities current through end of construction 2016
cy – cubic yard
FCF – Field Change Form
The volume of clay reported is based on the Parsons Daily Reports from January 2016. The tons of clay reported is based on the Parsons Sand and Gravel Delivery Totals 2016 Excel file

Table 5-2
QC Laboratory Analysis Frequency

Quarry	Sand Produced (cy)	VOCs Only		All Other Parameters	
		samples	cy/sample	samples	cy/sample
Amboy	98,738	28	3,526	28	3,526
Baldwin Ives	309,770	26	11,914	26	11,914
Elbridge	0	7	--	7	--
Geer (Palermo)	12,781	8	1,598	8	1,598
Granby	411,061	57	7,212	56	7,340
Hannibal	25,622	4	6,406	4	6,406
Harris	23,615	6	3,936	6	3,936
Hastings	0	2	--	2	--
Lake Road	42,193	18	2,344	18	2,344
Lindsey	92,942	31	2,998	31	2,998
Mexico	58,090	12	4,841	12	4,841
Nightingale	95,079	9	10,564	9	10,564
Northern Concrete	9,729	4	2,432	4	2,432
Palmyra	2,489	4	622	4	622
Panther Lake	314,546	18	17,475	18	17,475
Smith	162,641	16	10,165	16	10,165
Stoney Robby	23,389	4	5,847	4	5,847
Suit Kote	57,016	12	4,751	12	4,751
Wolcott	28,505	8	3,563	8	3,563
Total	**1,768,206**	**274**	**6,453**	**273**	**6,477**

Notes:
Field duplicate samples are not included in the sample quantities in this table.
cy – cubic yards
QC – quality control
VOC – volatile organic compound
All material delivered from Johnny Cake Quarry and Northeast Solite met the DER-10 Exclusion.
Analytical testing for clay from Marcellus was previously conducted for the the construction of the SCA.

Table 5-3

QC Sieve Analysis Frequency

Quarry	Medium Sand			Gravelly Sand			Fine Gravel			Coarse Gravel			Gravelly Cobble			Coarse Cobble			Light Weight Fill			Bank Run		
	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only) No.	QC Sieve Analyses (Final Only) cy/No.	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only) No.	QC Sieve Analyses (Final Only) cy/No.	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only) No.	QC Sieve Analyses (Final Only) cy/No.	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only) No.	QC Sieve Analyses (Final Only) cy/No.	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only) No.	QC Sieve Analyses (Final Only) cy/No.	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only) No.	QC Sieve Analyses (Final Only) cy/No.	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only) No.	QC Sieve Analyses (Final Only) cy/No.	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only) No.	QC Sieve Analyses (Final Only) cy/No.
Amboy	98,738	159	621	0	0	--	4,772	39	122	0	0	--	44,343	17	2,608	13,854	2	6,927	0	0	--	0	0	--
Baldwin Ives	309,770	197	1,572	175,474	64	2,742	71,273	83	859	24,182	10	2,418	22,299	10	2,230	0	0	--	0	0	--	0	0	--
Elbridge	0	0	--	0	0	--	0	0	--	0	0	--	0	0		0	0	--	0	0	--	4,313	7	616
Geer (Palermo)	12,781	25	511	17,201	29	593	0	0	--	5,478	5	1,096	0	0	--	0	0	--	0	0	--	0	0	--
Granby	411,061	633	649	23,614	29	814	128,587	128	1,005	43,014	16	2,688	44,255	19	2,329	0	0	--	0	0	--	7,005	2	3,503
Hannibal	25,622	38	674	19,275	1	19,275	0	0	--	33,817	13	2,601	14,510	4	3,628	0	0	--	0	0	--	0	0	--
Harris	23,615	42	562	33,685	46	732	9,529	19	502	4,539	7	648	0	0	--	0	0	--	0	0	--	0	0	--
Hastings	0	0	--	0	0	--	0	0	--	8,292	3	2,764	0	0	--	0	0	--	0	0	--	0	0	--
Johnny Cake	0	0	--	0	0	--	0	0	--	0	0	--	14,081	8	1,760	0	0	--	0	0	--	0	0	--
Lake Road	42,193	42	1,005	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--
Lindsey	92,942	111	837	0	0	--	41,455	23	1,802	0	17	--	0	0	--	0	0	--	0	0	--	0	0	--
Mexico	58,090	52	1,117	72,061	36	2,002	20,435	23	888	25,433	15	1,696	0	0	--	0	0	--	0	0	--	0	0	--
Nightingale	95,079	45	2,113	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--
Northeast Solite	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	1,801	11	164	0	0	--
Northern Concrete	9,729	6	1,622	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--
Palmyra	2,489	2	1,245	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--
Panther Lake	314,546	265	1,187	0	0	--	14,321	91	157	129,033	48	2,688	140,133	48	2,919	10,522	2	5,261	0	0	--	0	0	--
Smith	162,641	81	2,008	0	0	--	0	12	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--
Stoney Robby	23,389	28	835	7,221	3	2,407	891	26	34	3,827	1	3,827	0	0	--	0	0	--	0	0	--	0	0	--
Suit-Kote	57,016	14	4,073	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--
Wolcott	28,505	15	1,900	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--
Total	**1,768,206**	**1,755**	**1,008**	**348,531**	**208**	**1,676**	**291,263**	**444**	**656**	**277,615**	**135**	**2,056**	**279,621**	**106**	**2,638**	**24,376**	**4**	**6,094**	**1,801**	**11**	**164**	**11,318**	**9**	**1,258**

Notes:

cy – cubic yard

QC – quality control

The coarse cobble materials are combined (berm and protective edge). No sieve results were collected for the berm material. Visual inspection was used to confirm grade

Geotech analysis of light weight fill material was previously completed for the Willis Ave Barrier Wall. Sieve analysis report provided in Appendix 5F

Sieve analysis was performed at Smith for fine gravel and Lindsey for coarse gravel. However, neither material from the respective quarry was shipped to the lake.

Geotechnical testing for clay from Marcellus was previously conducted for the the construction of the SCA

Table 5-4
QA Observation Frequency for Sieve Analysis

Quarry	Medium Sand			Gravelly Sand			Fine Gravel			Coarse Gravel			Gravelly Cobble			Coarse Cobble			Light Weight Fill			Bank Run			All		
	QC Sieve Analyses	QA Observed	QA/QC %	QC Sieve Analyses (Final Only)	QA Observed	QA/QC %	QC Sieve Analyses (Final Only)	QA Observed	QA/QC %	QC Sieve Analyses (Final Only)	QA Observed	QA/QC %	QC Sieve Analyses (Final Only)	QA Observed	QA/QC %	QC Sieve Analyses (Final Only)	QA Observed	QA/QC %	QC Sieve Analyses (Final Only)	QA Observed	QA/QC %	QC Sieve Analyses (Final Only)	QA Observed	QA/QC %	QC Sieve Analyses (Final Only)	QA Observed	QA/QC %
Amboy	159	22	14%	0	0	--	39	5	13%	0	0	--	17	6	35%	2	0	0%	0	0	--	0	0	--	217	33	15%
Baldwin Ives	197	21	11%	64	6	9%	83	10	12%	10	1	10%	10	1	10%	0	0	--	0	0	--	0	0	--	364	39	11%
Elbridge	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	7	0	0%	7	0	0%
Geer (Palermo)	25	4	16%	29	3	10%	0	0	--	5	0	0%	0	0	--	0	0	--	0	0	--	0	0	--	59	7	12%
Granby	633	63	10%	29	3	10%	128	16	13%	16	6	38%	19	3	16%	0	0	--	0	0	--	2	0	0%	827	91	11%
Hannibal	38	8	21%	1	0	0%	0	0	--	13	0	0%	4	0	0%	0	0	--	0	0	--	0	0	--	56	8	14%
Harris	42	5	12%	46	5	11%	19	4	21%	7	1	14%	0	0	--	0	0	--	0	0	--	0	0	--	114	15	13%
Hastings	0	0	--	0	0	--	0	0	--	3	1	33%	0	0	--	0	0		0	0		0	0		3	1	33%
Johnny Cake	0	0	--	0	0	--	0	0	--	0	0	--	8	1	13%	0	0	--	0	0	--	0	0	--	8	1	13%
Lake Road	42	8	19%	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	42	8	19%
Lindsey	111	10	9%	0	0	--	23	4	17%	17	6	35%	0	0	--	0	0	--	0	0	--	0	0	--	151	20	13%
Mexico	52	4	8%	36	4	11%	23	5	22%	15	1	7%	0	0	--	0	0	--	0	0	--	0	0	--	126	14	11%
Nightingale	45	4	9%	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	45	4	9%
Northeast Solite	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	11	0	0%	0	0	--	11	0	0%
Northern Concrete	6	0	0%	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	6	0	0%
Palmyra	2	0	0%	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	2	0	0%
Panther Lake	265	31	12%	0	0	--	91	12	13%	48	7	15%	48	4	8%	2	1	50%	0	0	--	0	0	--	454	55	12%
Smith	81	8	10%	0	0	--	12	3	25%	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	93	11	12%
Stoney Robby	28	2	7%	3	1	33%	26	2	8%	1	0	0%	0	0	--	0	0	--	0	0	--	0	0	--	58	5	9%
Suit-Kote	14	0	0%	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	14	0	0%
Wolcott	15	2	13%	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	0	0	--	15	2	13%
Total	**1,755**	**192**	**11%**	**208**	**22**	**11%**	**444**	**61**	**14%**	**135**	**23**	**17%**	**106**	**15**	**14%**	**4**	**1**	**25%**	**11**	**0**	**0%**	**9**	**0**	**0%**	**2,672**	**314**	**12%**

Notes:

QA – quality assurance

QC – quality control

Sieve analysis for light weight fill was performed in 2008 and 2009 as a part of the Willis Barrier Wall Project

Sieve analysis was performed at Smith for fine gravel and Lindsey for coarse gravel. However, neither material from the respective quarry was shipped to the lake.

Geotechnical testing for clay from Marcellus was previously conducted for the the construction of the SCA

Table 5-5
Sources of Imported Topsoil

Quarry Name	Company	Location	Topsoil	
			cy	tons
Brewerton Speedway	Brewerton Raceway	Brewerton, NY	60,139	90,208
Costco	Costco	Camillus, NY	47,259	70,888
Legionnaire Drive	Alberici General Contractors	Cicero, NY	15,931	23,897
SCA	Honeywell	Geddes, NY	1,391	2,086
SOS (Route 57)	Syracuse Orthopedic Specialists	Clay, NY	395	592
National Guard Bureau	National Gurad Bureau	Mattydale, NY	1,676	2,514
Van Buren	Ryan Homes	Baldwinsville, NY	3,271	4,907
		Total	**130,062**	**195,092**

Notes:
Unit weight conversion (tons per cubic yard): Topsoil = 1.5
Quantities current through end of construction 2016.
cy – cubic yard

Table 5-6
QC Laboratory Analysis Frequency for Topsoil

Quarry	Topsoil Produced (cy)	VOCs Only		All Other Parameters	
		samples	cy/sample	samples	cy/sample
Brewerton Speedway	60,139	26	2,313	26	2,313
Costco	47,259	6	7,877	6	7,877
Legionnaire Drive	15,931	7	2,276	7	2,276
SCA	1,391	5	278	5	278
SOS (Route 57)	395	1	395	1	395
National Guard Bureau	1,676	2	838	2	838
Van Buren	3,271	5	654	5	654
Total	**130,062**	**52**	**2,501**	**52**	**2,501**

Notes:
Field duplicate samples are not included in the sample quantities in this table.
cy – cubic yards
QC – quality control
VOC – volatile organic compound

Table 5-7
QC Sieve Analysis Frequency for Topsoil

Quarry	Topsoil		
	Aggregate Supplied (cy)	QC Sieve Analyses (Final Only)	
		number	cy/number
Brewerton Speedway	60,139	27	2,227
Costco	47,259	19	2,487
Legionnaire Drive	15,931	3	5,310
SCA	1,391	5	278
SOS (Route 57)	395	1	395
National Guard Bureau	1,676	2	838
Van Buren	3,271	5	654
Total	**130,062**	**62**	**2,098**

Notes:
cy – cubic yard
QC – quality control

Table 5-8
QA Observation Frequency for Topsoil Sieve Analysis

Quarry	Topsoil		
	QC Sieve Analyses	QA Observed	QA/QC (%)
Brewerton Speedway	27	0	0%
Costco	19	3	16%
Legionnaire Drive	3	0	0%
SCA	5	0	0%
SOS (Route 57)	1	0	0%
National Guard Bureau	2	0	0%
Van Buren	5	0	0%
Total	**62**	**3**	**5%**

Notes:

QA – quality assurance

QC – quality control

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-001	8/29/2012	8/30/2012	C	9	Sand-Siderite	Lanes 108-112	0.32
C-002	8/30/2012	8/30/2012	C	9	Sand-Siderite	Lanes 103-107	0.38
C-003	9/4/2012	9/4/2012	C	9	Sand-Siderite	Lanes 87-102	1.13
C-004	9/8/2012	9/10/2012	C	10	Sand-Siderite	Lanes 176-194	1.33
C-005	9/20/2012	9/27/2012	C	10	Sand-GAC	Lanes 176-194	1.31
C-006	9/20/2012	9/21/2012	C	11	Sand-Siderite	Lanes 123-133	0.98
C-007	9/20/2012	9/24/2012	C	11	Sand-Siderite	Lanes 134-138	0.79
C-008	9/26/2012	9/26/2012	C	11	Sand-Siderite	Lanes 199-204	0.69
C-009	3/30/2016	4/6/2016	C	11	Sand-GAC	Lanes 129-133 and 200-204	0.80
C-010	10/3/2012	10/4/2012	C	11	Sand-GAC	Lanes 123-128	0.45
C-011	9/29/2012	10/2/2012	C	11	Sand-Siderite	Lanes 139-141	0.54
C-012	10/15/2012	10/22/2012	C	11	Sand-GAC	Lanes 134-136	0.44
C-013	10/5/2012	10/8/2012	C	10	Sand-Siderite	Nearshore Area A	0.27
C-014	10/8/2012	10/10/2012	C	10	Sand-Siderite	Nearshore Area B	0.28
C-015	10/15/2012	10/18/2012	SMU 8	4	Medium Sand	Lanes 164-173	0.96
C-016	10/15/2012	10/16/2012	SMU 8	4	Medium Sand	Lanes 174-183	0.41
C-017	10/16/2012	10/18/2012	SMU 8	4	Medium Sand	Lanes 157-163	0.95
C-018	10/17/2012	10/22/2012	SMU 8	4	Medium Sand	Lanes 145-156	1.25
C-019	10/19/2012	10/22/2012	SMU 8	3,4	Medium Sand	Lanes 128-144	1.67
C-020	10/23/2012	10/24/2012	SMU 8	3	Medium Sand	Lanes 114-127	1.13
C-021	10/23/2012	10/24/2012	SMU 8	3	Medium Sand	Lanes 101-113	0.90
C-022	10/23/2012	10/24/2012	C	10	Sand-GAC	Nearshore Area A	0.27
C-023	10/26/2012	11/14/2012	SMU 8	2,3	Medium Sand	Lanes 84-100	1.45
C-024	11/1/2012	11/14/2012	C	10	Sand-Siderite	Nearshore Area C	0.42
C-025	11/14/2012	12/12/2012	SMU 8	SMU 8	Medium Sand	Lanes 1-45	11.98
C-026	11/28/2012	12/11/2012	C	10	Sand-GAC	Nearshore Areas B & C	0.7
C-027	12/20/2012	4/4/2013	C	10	Sand-Siderite	Nearshore Area D	0.17
C-028	12/20/2012	4/4/2013	C	10	Sand-GAC	Nearshore Area D	0.17
C-029	12/20/2012	4/4/2013	C	10	Coarse Gravel	Nearshore Areas A to D	1.1
C-030	12/20/2012	4/4/2013	C	10	Coarse Gravel	Outboard Area Corresponding to Lanes 176-194	1.47
C-031	7/2/2013	7/10/2013	E	1	Sand-GAC	Sections 1-4 in Cap Model Area E3-North	7.32
C-032	7/3/2013	7/9/2013	E	2,3	Sand-GAC	Sections 5-13 in Cap Model Area E3-North	12.51
C-033	8/8/2013	8/27/2013	E	5	Medium Sand	Sections 17, 18, 22, 23, 24, 26, and 27 in Cap Model Area E1	6.1
C-034	8/30/2013	9/4/2013	E	12	Sand-GAC	Sections 1-8 in Cap Model Area E3-South-Deep	7.65
C-035	9/20/2013	9/24/2013	E	8,9	Sand-GAC	Sections 5-7B and 9-13 in Cap Model Area E3-South-Shallow	7.87
C-036	9/20/2013	9/24/2013	D	8,18,23,24	Sand-Siderite	Sections 13, 14, 16, and 17	4.63
C-037	9/26/2013	9/30/2013	E	8,9	Sand-GAC	Sections 14 and 15 in Cap Model Area E3-South-Shallow	1.75
C-038	9/30/2013	10/3/2013	D	15,18-22	Sand-Siderite	Sections 15, 18, 19, 20, 21, and 22	6.77
C-039	10/1/2013	10/3/2013	D	23-27,29,30	Sand-Siderite	Sections 28 and 32 ("Hot Spot")	1.93
C-040	10/17/2013	10/23/2013	D	23-30	Sand-Siderite	Sections 27, 29, and 31	4.0
C-041	10/14/2013	10/22/2013	D	19-22, 38	Sand-Siderite	Sections 19 and 22	0.16
C-042	10/11/2013	10/23/2013	D	8.29	Sand-Siderite	Sections 1, 8B, 9, 10, and 11	4.41

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-043	10/15/2013	4/9/2014	D	8,23	Sand-Siderite	Sections 2-8A, and 12	9.0
C-044	10/17/2013	10/23/2013	D	38	Sand-Siderite	Section 15	0.37
C-045	10/22/2013	10/24/2013	D	24, 27-29, 38	Sand-Siderite	Sections 30 and 33	2.0
C-046	10/23/2013	10/24/2013	D	8,18,23,24	Sand-GAC	Sections 13, 14, 16, and 17	4.6
C-047	10/28/2013	11/13/2013	D	10,11,27,29-32	Sand-Siderite	Sections 34-38 and 41-43	7.9
C-048	11/1/2013	11/13/2013	D	7,19-22,38	Sand-GAC	Sections 15, 18, 19, 21, and 22	5.1
C-049	11/13/2013	11/19/2013	D	24-31,38	Sand-GAC	Sections 27-33	7.5
C-050	11/12/2013	11/13/2013	D	29,30,32	Sand-Siderite	Sections 44 and 50	3.05
C-051	11/26/2013	12/5/2013	D	19,20,22,38	Sand-GAC	Nearshore portions of Sections 19, 22, and 33	0.4
C-052	12/4/2013	12/5/2013	D	27,29,30,31,32	Sand-GAC	Sections 34, 37, 38, 43, and 44	5.30
C-053	4/25/2014	4/29/2014	D	3,4,10,11	Sand-Siderite	Sections 23-26	4.45
C-054	4/25/2014	4/29/2014	D	11,12	Sand-Siderite	Sections 47, 48, 49, 53, and 54	5.56
C-055	4/28/2014	4/29/2014	D	12,13	Sand-Siderite	Sections 60, 61, 67, and 68	5.7
C-056	5/8/2014	5/13/2014	D	13,14	Sand-Siderite	Sections 69, 70, and 74	3.92
C-057	5/8/2014	5/13/2014	D	12,13	Sand-Siderite	Sections 55 and 62	3.33
C-058	5/9/2014	5/13/2014	D	13,14	Sand-Siderite	Sections 88, 89, and 90	3.64
C-059	5/12/2014	5/20/2014	D	12,13,14,29,30	Sand-Siderite	Sections 56, 57, 63, 75, 76, and 80	6.83
C-060	6/18/2014	6/19/2014	D	31-33,39	Sand-Siderite	Sections 33, 39, and 40	1.81
C-061	6/23/2014	6/24/2014	D	32,33,39	Sand-Siderite	Sections 45 and 46	2.37
C-062	6/13/2014	6/16/2014	D	14,15	Sand-Siderite	Section 91 (north half only)	0.84
C-063	6/16/2014	6/17/2014	D	5,16,17	Sand-Siderite	Sections 1-5 of Bowl Area	2.65
C-064	6/16/2014	6/19/2014	D	5,6,16,17	Sand-Siderite	Sections 7-11, 13-15, and 17-18 of Bowl Area	7.97
C-065	7/10/2014	7/15/2014	D	10,11	Sand-GAC	Sections 35, 36, 41, and 42	3.66
C-066	6/24/2014	6/30/2014	D	11,12	Sand-GAC	Sections 47-49	4.75
C-067	6/25/2014	7/1/2014	D	12,13	Sand-GAC	Sections 56-57	3.49
C-068	6/20/2014	6/24/2014	D	13,14	Sand-GAC	Sections 63-64	3.12
C-069	7/2/2014	7/10/2014	D	3,4,10,11	Sand-GAC	Sections 11-14	3.86
C-070	6/23/2014	6/25/2014	D	12,30,32-35,40	Sand-Siderite	Sections 51, 52, 58, and 59	5.64
C-071	6/25/2014	6/30/2014	D	12,13,34-37,40,41	Sand-Siderite	Sections 64-66 and 71-73	6.46
C-072	6/30/2014	7/2/2014	D	12,13	Sand-GAC	Sections 58 and 65	3.63
C-073	7/8/2014	7/10/2014	D	12,13	Sand-GAC	Sections 59 and 66	2
C-074	7/9/2014	8/4/2014	D	7,8	Sand-GAC	Section 20	1.53
C-075	7/10/2014	7/15/2014	D	12,13	Sand-GAC	Section 55	0.73
C-076	7/11/2014	7/15/2014	D	14	Sand-GAC	Sections 71, 72, and 73	4.07
C-077	7/22/2014	8/4/2014	D	22,24,28,38	Coarse Gravel	Topsoil portion of Seqences 2 and 3	1.58
C-078	8/8/2014	8/13/2014	D	13,14	Sand-GAC	Sections 15-17	2.51
C-079	8/1/2014	10/2/2014	D	5,6,16,17	Sand-Siderite	RA-D Bowl Area Sections 6 and 12	1.78
C-080	8/20/2014	8/25/2014	C	1,15	Sand-Siderite	RA-C - East, Sections 1-4 and part of Section 5	6.61
C-081	9/5/2014	9/10/2014	D	2,3,8,9,10	Sand-GAC	9-step area, Sections 2-6 and 11-12 in Lift E	7.91
C-082	9/10/2014	9/17/2014	D	31-37, 39-40	Sand-GAC	Sections 39-40, 45-46, 51-54, 60-62, 67-70, and 75 in Lift B	17.56
C-083	9/10/2014	9/17/2014	D	9,10	Sand-GAC	Sections 1 and 10 of Lift D	2.47
C-084	9/16/2014	9/17/2014	D	29,30	Sand-GAC	Section 50 of Lift B	1.33

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-085	9/17/2014	9/18/2014	D	8,9	Sand-GAC	Sections 7 and 10 of Lift E	1.94
C-086	9/18/2014	10/2/2014	A	3,4,5	Medium Sand	Multiple cap areas; B-cap, B-modified cap, C-cap	6.6
C-087	9/24/2014	11/10/2014	D	21,22,26,28,31	Coarse Gravel	Cap Types F and G, Sequences 2, 3, and 4	1.61
C-087 Addendum	11/30/2016	12/5/2016	D	28B	Coarse Gravel	Cap Type F-5A-I in Cap Model Area D-Center	0.03
C-088	10/17/2014	11/5/2014	SMU 8	1,2	Medium Sand	Sections 1-3 in Thin-Layer Cap	3.24
C-089	10/21/2014	11/10/2014	D	43	Multiple	Harbor Brook Outboard - sequential dredge-and-cap area	0.82
C-090	10/27/2014	11/18/2014	A	7-9	Sand-Siderite	RA-A, Cap Model Area A2	12.32
C-091	11/4/2014	11/7/2014	D	5,16,17	Sand-GAC	Bowl Area Sections 1-12	7.4
C-092	11/5/2014	11/13/2014	C	11A, 12-15	Sand-GAC	RA-C-East Sections 1-5 and 7	6.51
C-093	11/6/2014	11/13/2014	C	13,14	Sand-Siderite	Portion of Section 5B adjacent to retaining wall	0.23
C-094	11/14/2014	11/18/2014	A	8-11	Sand-Siderite	Sections 67, 74, 78, 79 (lanes 56-60 only), 81B, 82A, 82B, and 83	6.07
C-095	11/17/2014	12/3/2014	A	4	Medium Sand	Sections 54-56 and 58 (B-lift)	3.09
C-096	1/20/2015	1/22/2015	A	6	Medium Sand	Sections 57-62	8.14
C-096 Addendum	6/11/2015	6/16/2015	A	6	Medium Sand	Section 64	0.89
C-097	11/20/2014	11/25/2014	D	16,17	Sand-GAC	Portions of Sections 6, 11, and 12	0.6
C-098	11/20/2014	12/3/2014	C	12,13,14	Sand-GAC	Portion of Section 6	0.45
C-099	2/6/2015	2/18/2015	E	4	Medium Sand	Sections 1-17 of Lift E in Cap Model Area E1	12.96
C-100	2/6/2015	3/6/2015	E	11	Medium Sand	Cap Type C-2A-K in Cap Model Area E1	3.86
C-101	2/12/2015	2/19/2015	E	05A	Fine Gravel	Cap Type C-2A-K in Cap Model Area E1	4.75
C-102	2/12/2015	2/19/2015	E	1	Medium Sand	Cap Model Area E3-North	6.41
C-103	2/18/2015	3/6/2015	E	12	Medium Sand	Cap Model Area E3-South	7.01
C-104	2/9/2015	2/19/2015	E	2	Fine Gravel	Cap Model Area E3-North	10.08
C-105	2/10/2015	3/6/2015	E	8	Fine Gravel	Cap Model Area E3-South	7.23
C-106	2/24/2015	3/5/2015	D	10,11,12,13	Medium Sand	RA-D-East, Sections 27-30, 32-33, 35-37, and 40-41	15.35
C-107	3/5/2015	4/15/2015	D	39,40	Coarse Gravel	RA-D-Outboard Area	0.92
C-108	3/31/2015	5/21/2015	D	35A	Fine Gravel	Cap Type M-2A-J in Cap Model Area D East	2.10
C-109	6/3/2015	6/25/2015	A	1	Medium Sand	Cap Type E-1-A in Cap Model Area A1	29.5
C-110	6/30/2015	8/7/2015	A	2	Medium Sand	Cap Type D-2A-A in Cap Model Area A1	17.3
C-111	4/16/2015	4/30/2015	D	15,35,36,37,41	Sand-Siderite	Sections 77-79, 81-87, and partial Section 91	11.59
C-112	4/29/2015	5/11/2015	A	6	Medium Sand	Sections 63 and 65	0.95
C-113	4/29/2015	5/11/2015	A	11	Sand-Siderite	Section 83 (partial)	0.17
C-114	6/2/2015	6/9/2015	E	20,23,32,33	Gravelly Sand	Cap Model Area E1 - south of navigation channel	17.1
C-115	6/24/2015	7/9/2015	E	15,16,20	Gravelly Sand	Cap Model Area E1 - north of navigation channel	16.5
C-116	6/2/2015	7/20/2015	A	9	Sand-GAC	F-5A-S "hot spot"	0.22
C-118	7/8/2015	7/9/2015	D	13,14,15	Sand-GAC	Sections 74, 78, 79, 80, 81(partial), and 84	6.0

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-119	7/13/2015	7/20/2015	E	20	Gravelly Sand	Sloped portion of navigation channel - Cap Type Q-2A-K	2.26
C-120	7/16/2015	7/21/2015	B	6,7	Sand-Siderite	Sections 21 and 27-33	6.88
C-120 Addendum	7/22/2015	7/23/2015	B	6	Sand-Siderite	Section 18 (lanes 61-64a)	0.33
C-120 Addendum 2	12/22/2015	1/6/2016	B	6	Sand-Siderite	Cap Type U-6A-N in Cap Model Area WB 1-8	0.1
C-121	7/22/2015	7/30/2015	C	1,2,3,4	Sand-Siderite	Sections 1-10 in RA-C West	11.02
C-122	7/30/2015	8/6/2015	A	6	Coarse Gravel	Footprints 1-3, 15-17, and 27-29 in RA-A	0.93
C-123	7/30/2015	1/28/2016	A	6A	Topsoil	Footprints 1, 15, and 27 in RA-A	0.28
C-124	8/5/2015	8/7/2015	A	7,8,9,10,11	Sand-GAC	Sections 62-64 and 69-70, and portions of 67-68, 72, and 75	7.35
C-125	8/14/2015	5/31/2016	E	27,28	Gravelly Sand-GAC	MERC Cap adjacent to Metro pipeline in RA-E	4.3
C-126	8/14/2015	8/18/2015	A	8,9,10,11	Sand-GAC	Sections 65-66, 71, 73-74, and 76-78 and portions of 67-68, 72, and 75	10.3
C-127	8/27/2015	9/1/2015	E	30,31	Gravelly Sand-GAC	Cap Type OO-3B-M in Cap Model Area E2	1.9
C-128	8/18/2015	8/20/2015	E	21,22	Gravelly Sand-GAC	Cap Type OO-3B-M in Cap Model Area E3	7.2
C-129	8/20/2015	8/27/2015	E	22,31	Gravelly Sand-GAC	Cap Type OO-3B-M in Cap Model Area E3	1.4
C-130	8/24/2015	8/25/2015	E	19	Gravelly Sand-GAC	Cap Type QQ-2A-M in Cap Model Area E3	2.7
C-131	8/24/2015	8/27/2015	E	23	Gravelly Sand	Cap Type O-3B-K in Cap Model Area E1	1.1
C-132	8/31/2015	9/2/2015	D	14,15,35,36,37,41	Sand-GAC	Sections 75(E), 76-77, 82-83, and 85-87 in RA-D East	7.8
C-133	9/2/2015	9/8/2015	A	6	Coarse Gravel	Cap Type A-(3 to 6)A-A in Cap Model Area A1	8.56
C-134	9/2/2015	9/8/2015	C	4	Sand-GAC	Cap Type J-1/2-E in Cap Model Area C2	2.0
C-135	9/2/2015	9/8/2015	D	36,37	Sand-GAC	Section 86, Lane 196b in Cap Model Area D-East	0.065
C-136	9/3/2015	9/8/2015	E	15,17	Gravelly Sand	Cap Types N-3B/5B-K and Q-3B-K in Area E1	1.9
C-137	9/9/2015	9/24/2015	E	25	Sand-GAC	Cap Type S-1-R in Cap Model Area E3	2.25
C-138	9/11/2015	9/24/2015	C	1	Sand-GAC	Cap Type J-2A-D in Cap Model Area B1/C1	0.60
C-139	9/15/2015	10/1/2015	A	7	Medium Sand	Cap Type J-2A-B in Cap Model Area A2	1.3
C-140	9/22/2015	9/24/2015	E	21,24,26,29,30	Sand-GAC	Cap Types R-1-L, CC-2A-L and -M, and PP-2B-L and -M in Areas E2/E3	6.5
C-141	9/22/2015	9/24/2015	E	3,11	Gravelly Sand-GAC	Cap Types PP-2B-M and OO-3B-M in Cap Model Area E3	2.2
C-142	9/30/2015	10/1/2015	E	3,11,18,21	Sand-GAC	Cap Types CC-2A-M and PP-2B-M in Cap Model Area E3	3.75
C-143	10/27/2015	11/3/2015	A	6,9	Coarse Gravel	Cap Types A-5A/6A-A and F-3A/5A/6A-B	5.75
C-144	10/13/2015	10/20/2015	E	3,11	Gravelly Sand-GAC	Cap Types PP-2B-M and OO-3B-M	10.15
C-145	10/23/2015	10/27/2015	E	14	Gravelly Sand-GAC	Cap Type NN-3B/5B-M	1.6
C-146	10/22/2015	10/22/2015	E	16	Gravelly Sand	Cap Type O-3B-K in Cap Model Area E1	1.9
C-147	10/23/2015	10/27/2015	D	43	Sand-GAC	Cap Type T-5A/6A-Q in Cap Model Area OB-East	4.6
C-148	10/26/2015	10/28/2015	B	7	Sand-GAC	Cap Type U-3A/6A-N in Cap Model Area WB 1-8	3.3
C-149	11/11/2015	11/23/2015	C	4A	Medium Sand	Cap Type J-1/2A-E in Cap Model Area C2	1.85
C-150	10/29/2015	11/3/2015	E	13	Gravelly Sand-GAC	Cap Type QQ-3B-M in Cap Model Area E3	0.65
C-151	11/2/2015	11/3/2015	E	13	Gravelly Sand-GAC	Cap Type QQ-3B-M in Cap Model Area E3	1.0
C-152	11/17/2015	12/3/2015	D	5,6A	Medium Sand	Cap Type J-1/2A-G in Cap Model Area D-SMU2	7.4
C-153	11/5/2015	11/5/2015	D	45	Sand-Siderite	Modified Protective Cap Area RA-D-1A	7.0
C-154	11/11/2015	11/19/2015	A	9,11	Coarse Gravel	Cap Types U-6A-B and F-3A/5A-B in Cap Model Area A2	3.1
C-154 Addendum	1/5/2016	1/6/2016	A	11A	Coarse Gravel	Cap Type U-6A-B in Cap Model Area A2	0.25
C-154 Addendum 2	3/15/2016	3/24/2016	A	9	Coarse Gravel	Cap Type F-3A/5A-B in Cap Model Area A2	0.04
C-155	11/10/2015	11/10/2015	B	6	Sand-GAC	Cap Type L-3A/5A-D in Cap Model Area B1/C1	4.0

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-156	11/11/2015	11/12/2015	C	2,3	Sand-GAC	Cap Types H-2A/3B-D and L-3A/5A-D in Cap Model Area B1/C1	2.4
C-157	2/3/2016	2/10/2016	B	2,5,8	Sand-Siderite	Cap Type RA-B-1A in Cap Model Area B1/C1, and RA-B-1E in Cap Model Area B2	4.35
C-157 Addendum	4/12/2016	4/18/2016	B	14	Sand-Siderite	Cap Type RA-B-1E in Cap Model Area B2	0.40
C-158	3/24/2016	4/12/2016	E	10	Medium Sand	Section 8 (lanes 38-41e) in Cap Model Area E1	0.25
C-159	1/5/2016	1/6/2016	A	2	Medium Sand	Cap Type D-2A-A in Cap Model Area A1	1.31
C-160	12/8/2015	12/9/2015	E	31,34,35	Gravelly Sand-GAC	Cap Types NN-3B/5B/6B-L and OO-3B-L in Cap Model Area E2	13.4
C-161	12/22/2015	12/27/2015	B	7	Coarse Gravel	Cap Type U-6A-N in RA-B Connected Wetland	2.8
C-162	12/29/2015	1/6/2016	A	11	Topsoil	Cap Type U-6A-B in Ninemile Creek spits	1.85
C-163	2/19/2016	2/24/2016	C	1	Medium Sand	Cap Type J-2A-D in Cap Model Area B1/C1	0.55
C-164	4/27/2016	4/28/2016	B	12	Sand-GAC	Cap Type RA-B-1D in Cap Model Area B1/C1	0.18
C-165	2/18/2016	2/25/2016	SMU 8	47	Sand-GAC	Amended TLC Model Area B	8.89
C-166	2/23/2016	2/24/2016	A	3	Fine Gravel	Cap Type C-2A-A in Cap Model Area A1	2.39
C-166 Addendum	1/9/2017	2/8/2017	A	3B	Fine Gravel	Cap Type C-2A-A in Cap Model Area A1	0.15
C-167	3/1/2016	3/3/2016	A	4A	Fine Gravel	Cap Type B-3A-A in Cap Model Area A1	2.19
C-168	2/23/2016	2/25/2016	A	4B	Coarse Gravel	Cap Type Modified B(2)-3A-A in Cap Model Area A1	2.78
C-169	2/22/2016	2/24/2016	SMU 8	46	Sand-GAC	Amended TLC Model Area A	8.21
C-170	2/23/2016	2/25/2016	D	35B	Fine Gravel	Cap Type M-2A-J in Cap Model Area D East	2.07
C-171	3/1/2016	5/12/2016	A	4D	Fine Gravel	Cap Type B-3A-A in Cap Model Area A1	0.24
C-172	7/13/2016	7/25/2016	D	35C	Fine Gravel	Cap Type M-2A-J in Cap Model Area D East	0.79
C-173	3/1/2016	3/2/2016	A	9	Topsoil	Cap Type F-3A/5A/6A-B in Cap Model Area A2	2.67
C-174	2/29/2016	3/2/2016	E	17	Multiple	Cap Type N-3B/5B-K in Cap Model Area E1	1.20
C-175	3/7/2016	3/24/2016	D	10,11,12	Medium Sand	Cap Type J-1/2A-J in Cap Model Area D-East	6.25
C-176	3/15/2016	4/7/2016	E	14	Multiple	Cap Type NN-3B/5B-M in Cap Model Area E3	1.70
C-177	3/1/2016	4/18/2016	D	19A,23,27,29A,32	Fine Gravel	Cap Types M-2A-H and M-2A-I in Model Areas D-West and D-Center	11.08
C-178	3/18/2016	3/29/2016	E	19	Gravelly Cobble	Cap Type QQ-2A-M in Cap Model Area E3	2.79
C-179	3/15/2016	7/19/2016	A	8A	Fine Gravel	Cap Type H-2A/3A-B in Cap Model Area A2	4.51
C-180	3/16/2016	4/7/2016	C	11A,15	Medium Sand	Cap Type J-1/2A-D in Cap Model Area C3	6.1
C-181	3/16/2016	3/24/2016	E	24,25	Medium Sand	Cap Types R-1-L and S-1-R in Cap Model Areas E2 and E3, respectively	3.83
C-182	3/23/2016	3/29/2016	E	6,7	Multiple	Cap Types O-3B-K and P-2B-K in Cap Model Area E1	10.55
C-183	3/18/2016	4/7/2016	D	26	Medium Sand	Cap Type F-3B-I/U in Cap Model Area D-Center	0.36
C-184	4/1/2016	5/10/2016	D	25	Fine Gravel	Cap Type H-3B-I/U in Cap Model Area D-Center	0.29
C-185	3/24/2016	3/29/2016	E	5B	Fine Gravel	Cap Type C-2A-J in Cap Model Area E1	5.28
C-186	3/23/2016	4/20/2016	D	30	Fine Gravel	Cap Type H-3B-I/U in Cap Model Area D-Center	3.26
C-187	3/24/2016	3/29/2016	E	20	Gravelly Cobble	Cap Type Q-2A-K in Cap Model Area E1	4.18
C-189	3/28/2016	3/30/2016	D	41	Coarse Gravel	Cap Type U-5A/6A-P in Cap Model Area OB-Center	2.01
C-189 Addendum	8/24/2016	8/25/2016	D	41	Coarse Gravel	Cap Type U-5A/6A-P in Cap Model Area OB-Center	0.22
C-190	4/1/2016	4/6/2016	D	39,40,41	Multiple	Cap Type U-6A/9B-O in OB-West and U-6A-P in OB-Center	1.54
C-191	3/24/2016	3/24/2016	D	44	Monolayer	4.5-inch average mono-layer cap (see FCF 045)	1.17
C-192	3/30/2016	4/28/2016	E	15	Gravelly Cobble	Cap Type Q-3B-K in Cap Model Area E1	1.67
C-193	4/4/2016	4/12/2016	E	13A	Gravelly Cobble	Cap Type QQ-3B-M in Cap Model Area E3	0.94
C-194	4/1/2016	4/7/2016	D	31B	Coarse Gravel	Cap Type F-3B-I in Cap Model Area D-Center	0.36
C-195	4/4/2016	4/28/2016	A	4C	Fine Gravel	Cap Type Modified B-3A-A in Cap Model Area A1	0.28

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-196	3/30/2016	4/6/2016	B	1	Sand-Siderite	Sections 7-12, 17-20, and 22-24 of Cap Type J-1/2A-C and J-1/2A-D	3.85
C-197	3/30/2016	3/31/2016	D	14,15	Sand-Siderite	Portion of Sections 92-94 in Cap Type J-2A-J	0.87
C-198	4/4/2016	5/25/2016	D	43	Coarse Gravel	Cap Type T-5A/6A-Q in Cap Model Area OB-East	3.99
C-199	4/4/2016	4/6/2016	B	3	Sand-Siderite	Cap Type RA-B-1B in Cap Model Area B2	0.66
C-200	4/4/2016	4/6/2016	B	11	Sand-Siderite	Cap Type RA-B-1D in Cap Model Area B1/C1	0.33
C-201	4/4/2016	4/6/2016	B	15	Sand-Siderite	Cap Type RA-B-1E in Cap Model Area B1/C1	0.34
C-202	5/11/2016	5/26/2016	C	11B, 11D	Medium Sand	Lanes 114-119 in Cap Type J-1/2A-F	0.45
C-203	4/18/2016	4/21/2016	E	9	Gravelly Sand	Cap Type Q-3B-K in Cap Model Area E1	1.40
C-204	4/8/2016	4/12/2016	B	8	Sand-Siderite	Cap Type RA-B-1C in Cap Model Area B1/C1	0.8
C-205	4/8/2016	4/12/2016	B	12	Sand-Siderite	Cap Type RA-B-1D in Cap Model Area B1/C1	0.18
C-206	4/11/2016	4/12/2016	B	6	Sand-Siderite	Cap Type L-3A-D in Cap Model Area B1/C1	0.56
C-207	4/12/2016	4/18/2016	C	13,14	Coarse Gravel	Cap Types L-3B-F and K-5B-F in Cap Model Area C3	0.29
C-208	5/31/2016	6/1/2016	D	36,42	Sand-GAC	Lift D, Sections 18-21 in Cap Type M-2A-J and H-3B-J	2.17
C-209	4/15/2016	4/25/2016	B	6	Coarse Gravel	Cap Type L-3A/5A-D in Cap Model Area B1/C1	3.09
C-210	4/15/2016	4/19/2016	C	3	Coarse Gravel	Cap Type L-3B/5B-D in Cap Model Area B1/C1	1.15
C-211	4/27/2016	5/16/2016	E	3,21	Coarse Gravel	Cap Type PP-2B-M in Cap Model Area E3	5.50
C-212	4/20/2016	5/9/2016	B	10	Monolayer	7.5-inch average mono-layer cap (RA-B-1D)	0.69
C-213	5/11/2016	5/16/2016	B	4	Monolayer	2-inch average mono-layer cap (RA-B-1C)	1.86
C-214	5/2/2016	6/6/2016	D	18	Fine Gravel	Cap Type H-3B-I in Cap Model Area D-Center	0.84
C-215	4/28/2016	4/28/2016	D	14,15,35C,36	Sand-GAC	portions of Lift B, Sections 57-60 in D-East	1.35
C-216	5/2/2016	5/16/2016	D	12C	Medium Sand	Lift C, Section 31 in Cap Type J-1/2A-I	0.93
C-217	5/2/2016	5/4/2016	D	45	Sand-GAC	Modified Protective Cap Area RA-D-1A	5.9
C-218	5/4/2016	5/16/2016	E	22	Gravelly Cobble	Cap Type OO-3B-M in Cap Model Area E3	8.27
C-219	5/4/2016	5/18/2016	E	30A	Coarse Gravel	Cap Types PP-2B-L and -M in Cap Model Areas E2 and E3	1.64
C-220	5/2/2016	5/10/2016	D	29B	Fine Gravel	Cap Type M-2A-I in Model Area D-Center	0.32
C-221	6/10/2016	6/14/2016	A	6A	Topsoil	Cap Type A-(3 to 6)A-A in Cap Model Area A1	9.41
C-222	5/5/2016	5/23/2016	E	18,26,29A	Fine Gravel	Cap Types CC-2A-L and -M in Cap Model Areas E2 and E3	7.56
C-223	5/6/2016	5/11/2016	B	9	Monolayer	7.5-inch average mono-layer cap (RA-B-1D)	0.86
C-224	5/4/2016	5/17/2016	D	40	Coarse Gravel	Cap Type U-3A/5A/6A/9A-O in OB-West and U-5A/6A-P in OB-Center	2.07
C-225	5/5/2016	6/7/2016	E	6	Coarse Gravel	Cap Type P-2B-K in Cap Model Area E1	1.76
C-226	5/6/2016	5/16/2016	E	20B	Gravelly Cobble	Cap Type Q-3B-K in Cap Model Area E1	0.59
C-227	5/10/2016	6/13/2016	D	20A	Fine Gravel	Cap Type H-3B-H in Cap Model Area D-West	1.05
C-228	5/5/2016	5/9/2016	B	1	Sand-GAC	7.5-inch minimum sand-GAC layer in Model Area RA-B-1A	1.75
C-229	5/20/2016	6/22/2016	C	12	Fine Gravel	Cap Type H-2A/3B-F in Cap Model Area C3	0.98
C-230	5/12/2016	6/6/2016	E	9	Gravelly Cobble	Cap Type Q-3B-K in Cap Model Area E1	1.44
C-231	5/6/2016	5/9/2016	B	13A	Sand-GAC	6-inch minimum sand-GAC layer in Model Area RA-B-1E	0.84
C-232	5/6/2016	5/9/2016	D	36,42	Sand-Siderite	Lift B, Sections 91-94 in Model Area D-East	1.75
C-233	5/10/2016	5/12/2016	B	11	Sand-GAC	4.5-inch minimum sand-GAC layer in Model Area RA-B-1D	0.33
C-234	5/10/2016	5/11/2016	B	1	Sand-GAC	7.5-inch minimum sand-GAC layer in Model Area RA-B-1A	1.1
C-235	5/16/2016	5/17/2016	B	8	Sand-GAC	9-inch minimum sand-GAC layer in Model Area RA-B-1C	0.80
C-236	5/16/2016	5/23/2016	D	39	Coarse Gravel	Cap Type U-5A/6A/9B-O in Cap Model Area OB-West	2.34
C-237	6/29/2016	7/19/2016	E	16	Gravelly Cobble	Cap Type O-3B-K in Cap Model Area E1	14.27

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-238	5/11/2016	5/11/2016	B	3	Sand-GAC	3-inch minimum sand-GAC layer in Model Area RA-B-1B	0.66
C-239	5/12/2016	6/27/2016	C	2	Fine Gravel	Cap Type H-2A/3B-D in Cap Model Area B1/C1	1.30
C-240	5/12/2016	6/28/2016	C	3	Fine Gravel	Cap Type L-3B/5B-D in Cap Model Area B1/C1	1.15
C-241	5/11/2016	5/16/2016	B	5	Monolayer	8-inch average mono-layer cap (RA-B-1C)	1.17
C-242	5/16/2016	7/19/2016	D	8,9,10	Medium Sand	Cap Type J-1/2A-I in Cap Model Area D-Center	5.7
C-243	6/9/2016	6/13/2016	C	13	Fine Gravel	Cap Type L-3B-F in Cap Model Area C3	0.10
C-244	5/13/2016	5/24/2016	D	43	Coarse Gravel	Cap Type T-5A/6A-Q in Cap Model Area OB-East	1.09
C-245	5/18/2016	5/19/2016	C	9	Sand-Siderite	1.5-inch minimum sand-siderite layer in Model Area RA-C-1A	0.7
C-246	5/13/2016	5/16/2016	B	6	Sand-GAC	Sections 18 and 21 of Lift B in Cap Type L-3A-D	0.24
C-247	6/13/2016	7/19/2016	D	13,14,15	Medium Sand	Sections 42-44, 46-53, 17-19, and 21 in Cap Type J-1/2A-J	17.78
C-248	5/16/2016	5/18/2016	E	33	Gravelly Cobble	Cap Type N-3B/5B/6B-K in Cap Model Area E1	5.67
C-249	5/16/2016	5/19/2016	E	34A	Gravelly Cobble	Cap Type NN-3B/5B-L in Cap Model Area E2	2.70
C-250	5/20/2016	6/21/2016	D	31	Medium Sand	Cap Type F-3B-I in Cap Model Area D-Center	0.72
C-251	5/18/2016	5/18/2016	D	34	Coarse Gravel	Cap Type F-3B/5A-I in Cap Model Area D-Center	2.6
C-252	5/23/2016	6/15/2016	E	11	Gravelly Cobble	Cap Type OO-3B-M in Cap Model Area E3	12.09
C-253	5/19/2016	5/23/2016	B	17	Monolayer	10-inch average mono-layer cap (RA-B-1F)	0.05
C-254	5/25/2016	5/26/2016	B	16	Sand-GAC	Lift D, Sections 22 and 23 in Cap Type J-1-D	0.35
C-255	5/19/2016	5/23/2016	B	6	Sand-GAC	Lift B, Sections 26 and 29 in Cap Type L-3A-D	0.4
C-256	5/26/2016	6/6/2016	B	7	Topsoil	Cap Type U-6A-N in RA-B Connected Wetland	2.73
C-257	6/3/2016	6/6/2016	C	21	Medium Sand	Lift A, Sections 1-5, 4.5-inch thin layer cap	5.6
C-258	6/9/2016	6/20/2016	E	7A	Gravelly Cobble	Cap Type O-3B-K in Cap Model Area E1	8.04
C-259	7/8/2016	7/25/2016	E	23	Gravelly Cobble	Cap Type O-3B-K in Cap Model Area E1	8.98
C-260	6/29/2016	8/2/2016	B	6A	Fine Gravel	Cap Type L-3A/5A-D in Cap Model Area B1/C1	2.16
C-261	6/3/2016	6/7/2016	C	16,17	Sand-GAC	Lift A, Sections 11-13 in GAC Direct Application area	1.3
C-262	6/3/2016	6/13/2016	B	8	Fine Gravel	Cap Type Modified H-2A/3A-D in Cap Model Area RA-B-1C	0.80
C-263	7/12/2016	7/19/2016	B	15	Coarse Gravel	Cap Type Modified L-3A-D in Cap Model Area RA-B-1E	0.34
C-264	6/3/2016	6/6/2016	B	13B,14,15	Sand-GAC	Lift C, Sections 27-29 in Cap Model Area RA-B-1E	1.1
C-265	6/3/2016	6/13/2016	B	6B	Coarse Gravel	Cap Type L-3A-D in Cap Model Area B1/C1	0.42
C-266	6/3/2016	6/28/2016	A	8B	Fine Gravel	Cap Type H-3A-B in Cap Model Area A2	2.67
C-267	6/3/2016	6/6/2016	B	2	Sand-GAC	Lift D, Sections 4, 7, 8, 11, and 14 in Cap Model Area B1/C1	3.41
C-268	6/3/2016	6/7/2016	SMU 8	20	Sand-GAC	Lift A, Section 6 in GAC Direct Application area	1.06
C-269	6/21/2016	6/22/2016	E	7B	Gravelly Cobble	Cap Type O-3B-K in Cap Model Area E1	1.10
C-270	6/8/2016	6/22/2016	E	32	Gravelly Cobble	Cap Type O-3B-K in Cap Model Area E1	3.39
C-271	6/6/2016	6/7/2016	C	5,25	Sand-Siderite	Lift A, Sections 6-7 in Cap Model Area RA-C-2A	0.64
C-272	6/8/2016	6/8/2016	D	37	Coarse Gravel	Cap Type F-3B/5A-J in Cap Model Area D-East	2.62
C-273	6/21/2016	7/6/2016	D	24A	Fine Gravel	Cap Type H-3B-I/U in Cap Model Area D-Center	1.97
C-274	6/13/2016	6/14/2016	C	18	Monolayer	Lift A, Section 14 and Lift B, Section 3 of Cap Model Area RA-C-1D	0.5
C-275	6/10/2016	6/27/2016	D	28A	Medium Sand	Cap Type F-3B-I in Cap Model Area D-Center	0.1
C-276	7/8/2016	7/21/2016	B	16	Medium Sand	Lift F, Section 5 in Cap Type J-1/2A-D	0.33
C-277	6/14/2016	6/28/2016	A	9B	Topsoil	Cap Type F-3A/5A-B in Cap Model Area A2	2.1
C-278	6/24/2016	6/27/2016	C	22	Monolayer	Lift A, Section 4 in Cap Model Area RA-C-2B	0.36
C-279	6/21/2016	6/22/2016	F	1	Medium Sand	Cap Type B-3A-T in Cap Model Area F1	0.09

Table 5-9
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Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-280	7/1/2016	7/6/2016	F	2	Medium Sand	Cap Type D-2A-T in Cap Model Area F1	0.48
C-281	6/21/2016	7/6/2016	D	34A	Medium Sand	Cap Type F-3B-I in Cap Model Area D-Center	2.21
C-282	7/6/2016	7/25/2016	B	6B	Fine Gravel	Cap Type L-3A-D in Cap Model Area B1/C1	0.42
C-283	6/21/2016	6/21/2016	C	23	Monolayer	Lift B, Section 2, 9-inch average sand-siderite-GAC layer	0.67
C-284	6/22/2016	6/23/2016	C	4B,6,7,8	Monolayer	Lift B, Sections 3, 4, 6, and 7, 7.5-inch minimum layer	2.42
C-285	6/22/2016	6/29/2016	D	24,33A	Fine Gravel	Cap Type H-3B-I (with topsoil) in Cap Model Area D-Center	0.33
C-286	6/27/2016	6/30/2016	E	29B,30B,31D,34	Gravelly Sand-GAC	Lift A, Sections 1-7 in Cap Model Area E2	1.46
C-287	7/13/2016	7/18/2016	C	23	Medium Sand	Lift C, Section 1 in Cap Model Area RA-C-2C	0.67
C-289	6/27/2016	6/28/2016	C	9	Sand-GAC	Lift E, Section 1 in Cap Model Area RA-C-1A	0.56
C-290	6/28/2016	6/28/2016	D	6B,6C,7B	Sand-Siderite	Lift B, Sections 3-4 of Cap Model Area D-West	1.65
C-290 Addendum	9/28/2016	9/28/2016	D	6B	Sand-Siderite	Lift A, Portion of Section 19 in Cap Model Area D-West	0.35
C-291	7/1/2016	7/5/2016	B	6D	Coarse Gravel	Cap Type L-3A/5A-D in Cap Model Area B1/C1	0.45
C-292	7/6/2016	7/7/2016	B	1	Medium Sand	Lift E, Sections 1, 2, 4, 6, and 7 in Cap Model Area RA-B-1A	2.86
C-293	7/1/2016	7/5/2016	D	45	Medium Sand	Lift E, Sections 1-6 in Cap Model Area RA-D-1A	4.9
C-294	7/1/2016	7/6/2016	B	3	Medium Sand	Lift D, Section 16 in Cap Model Area RA-B-1B	0.66
C-295	6/29/2016	7/19/2016	SMU 8	19	Medium Sand	Lifts A-D in the transition area described in MPC RA-C-1	0.70
C-296	7/6/2016	7/7/2016	A	9C	Topsoil	Cap Type F-3A/5A-B in Cap Model Area A2	1.94
C-297	7/1/2016	7/5/2016	C	5,25	Sand-GAC	Lift B, Sections 8 and 9 in Cap Types RA-C-2A and L-5B-E	0.64
C-298	8/8/2016	8/15/2016	D	7	Medium Sand	Lift C, Sections 20-22 in Cap Type J-1/2A-H	3.25
C-299	7/6/2016	7/25/2016	B	2	Medium Sand	Lift F, Sections 1-4 in Cap Model Area B2	3.4
C-301	7/6/2016	7/19/2016	E	13B	Gravelly Cobble	Cap Type QQ-3B-M in Cap Model Area E3	0.70
C-302	7/5/2016	7/5/2016	B	6E	Coarse Gravel	Cap Type L-3A/5A-D in Cap Model Area B1/C1	0.17
C-303	7/7/2016	7/7/2016	A	11B	Topsoil	Cap Type U-6A-B in Cap Model Area A2	0.47
C-304	7/7/2016	7/25/2016	A	10	Coarse Gravel	Cap Type I-2B/3B-B in Cap Model Area A2	0.66
C-305	8/4/2016	8/9/2016	D	6C	Sand-GAC	Lift C, Sections 1-3 in Cap Model Area RA-D-2	1.7
C-306	7/8/2016	7/19/2016	B	13A,13B	Medium Sand	Lift E, Section 8 in Cap Model Area RA-B-1E	1.0
C-307	7/11/2016	7/20/2016	B	11	Fine Gravel	Cap Type Modified H-2A/3A-D in Cap Model Area RA-B-1D	0.33
C-308	7/12/2016	7/19/2016	B	12	Coarse Gravel	Cap Type Modified L-3A-D in Cap Model Area RA-B-1D	0.18
C-309	7/11/2016	7/19/2016	B	14	Fine Gravel	Cap Type Modified H-2A/3A-D in Cap Model Area RA-B-1E	0.41
C-310	7/13/2016	7/19/2016	C	24	Sand-GAC	Lift A, Section 5 and Lift DA, Section 1 in GAC Direct Application area	0.31
C-311	7/12/2016	7/18/2016	D	6B,19B,20B,21,22	Sand-Siderite	Adjacent to 48-inch outfall; west end of CMUs 19-22	0.026
C-312	7/13/2016	7/26/2016	D	36A	Fine Gravel	Cap Type H-3B-J in Cap Model Area D-East	1.78
C-313	7/13/2016	8/1/2016	B	6C	Fine Gravel	Cap Type L-3A/5A-D in Cap Model Area B1/C1	0.67
C-314	7/13/2016	7/25/2016	B	6D	Fine Gravel	Cap Type L-3A/5A-D in Cap Model Area B1/C1	0.56
C-315	7/14/2016	7/25/2016	E	34A	Coarse Gravel	Cap Type NN-3B/5B-L in Cap Model Area E2	2.70
C-316	7/14/2016	8/1/2016	C	4B, 7	Medium Sand	Lift D, Sections 1-3 in Cap Model Area RA-C-2A	1.8
C-317	7/13/2016	7/25/2016	E	35	Gravelly Cobble	Cap Type OO-3B-L in Cap Model AreaEA2	0.26
C-318	7/21/2016	8/25/2016	D	42	Fine Gravel	Cap Type M-2A-J in Cap Model Area D East	0.35
C-319	7/25/2016	8/31/2016	D	36B	Fine Gravel	Cap Type H-3B-J in Cap Model Area D East	1.57
C-320	8/9/2016	8/10/2016	E	34B	Multiple	Cap Type NN-3B/5B/6B-L in Cap Model Area E2	5.09
C-321	7/15/2016	7/18/2016	F	1	Medium Sand	Cap Type D-2A-T in Cap Model Area F1	0.15
C-322	7/21/2016	7/25/2016	F	1	Fine Gravel	Cap Type B-3A-T in Cap Model Area F1	0.01

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
C-323	7/15/2016	8/2/2016	B	6E	Fine Gravel	Cap Type L-3A/5A-D in Cap Model Area B1/C1	0.24
C-324	7/14/2016	7/20/2016	C	9	Medium Sand	Lift G, Section 1 in Cap Model Area RA-C-1A	0.08
C-325	7/18/2016	7/18/2016	D	6B	Sand-GAC	Lift D, Sections 4-7 in Cap Model Area D-West	2.02
C-326	7/27/2016	8/9/2016	D	37A	Medium Sand	Cap Type F-3B-J in Cap Model Area D-East	1.72
C-327	7/21/2016	7/21/2016	D	6B,19B,20B,22	Sand-GAC	Adjacent to 48-inch outfall; west end of CMUs 19-22	0.1
C-328	7/21/2016	7/26/2016	E	36	Gravelly Cobble	Cap Type OO-3B-M in Cap Model Area E3	1.87
C-329	7/21/2016	8/2/2016	E	30B	Coarse Gravel	Cap Type PP-2B-L in Cap Model Area E2	0.48
C-330	7/21/2016	8/2/2016	E	29B	Fine Gravel	Cap Type CC-2A-L in Cap Model Area E2	0.79
C-331	7/21/2016	8/1/2016	D	33B	Fine Gravel	Cap Type H-3B-I in Cap Model Area D-Center	0.39
C-332	8/4/2016	8/9/2016	D	6C	Medium Sand	Lift E, Sections 1-3 in Cap Model Area RA-D-2	2.0
C-333	7/26/2016	7/26/2016	C	25	Coarse Gravel	Cap Type L-5B-E in Cap Model Area C2	0.44
C-334	7/27/2016	8/9/2016	C	6	Fine Gravel	Cap Type Modified H-2A/3B-E in Cap Model Area RA-C-2A	0.48
C-335	8/8/2016	8/16/2016	D	6B	Medium Sand	Lift E, Sections 4-7 in Cap Model Area D-West	2.0
C-336	7/27/2016	8/1/2016	C	5	Coarse Gravel	Cap Type Modified L-3B-E in Cap Model Area RA-C-2A	0.26
C-337	8/11/2016	8/15/2016	D	16	Fine Gravel	Cap Type M-2A-G in Cap Model Area D-SMU2	0.5
C-338	8/9/2016	8/16/2016	C	14	Fine Gravel	Cap Type K-5B-F in Cap Model Area C3	0.19
C-339	8/10/2016	8/16/2016	D	17	Multiple	RA-D Western Naturalized Shoreline (See FCF-057)	0.76
C-340	8/11/2016	8/16/2016	E	31A	Gravelly Cobble	Cap Type OO-3B-L in Cap Model Area E2	4.28
C-341	9/26/2016	9/28/2016	E	31B	Gravelly Cobble	Cap Type OO-3B-L in Cap Model Area E2	1.42
C-342	8/11/2016	8/16/2016	C	25	Fine Gravel	Cap Type L-5B-E in Cap Model Area E2	0.37
C-343	8/15/2016	8/16/2016	D	48	Multiple	RA-D Eastern Naturalized Shoreline (See FCF-058)	0.49
C-344	8/15/2016	8/25/2016	E	33	Coarse Gravel	Cap Type N-3B/5B/6B-K in Cap Model Area E1	5.41
C-345	8/15/2016	9/1/2016	D	21	Medium Sand	Cap Type F-3B-H in Cap Model Area D-West	0.21
C-346	8/16/2016	8/23/2016	D	22	Medium Sand	Cap Type G-5A-H in Cap Model Area D-West	0.17
C-347	8/16/2016	8/31/2016	D	19B	Fine Gravel	Cap Type M-2A-H in Cap Model Area D-West	0.35
C-348	8/16/2016	8/31/2016	D	20B	Fine Gravel	Cap Type H-3B-H in Cap Model Area D-West	0.13
C-349	8/25/2016	8/31/2016	D	6B	Medium Sand	Portion of Lift E Section 7 in Cap Model Area D-West	0.08
C-350	9/23/2016	9/27/2016	D	40	Topsoil	Cap Types U-5A/6A-P and U-5A/6A/9A-O in RA-D Outboard Area	3.3
C-351	9/30/2016	10/5/2016	D	41A	Topsoil	Cap Type U-5A/6A-P in RA-D Outboard Area	2.02
C-352	10/27/2016	10/31/2016	D	39	Topsoil	Cap Type U-5A/6A/9B-O in RA-D Outboard Area	3.48
C-353	11/1/2016	11/3/2016	D	38	Topsoil	Cap Type U-3A/5A/6A-O in RA-D Outboard Area	0.86
C-354	11/2/2016	11/15/2016	D	34B	Topsoil	Cap Type F-5A-I in Cap Model Area D-Center	0.34
C-355	11/4/2016	11/15/2016	E	34C	Topsoil	Cap Type NN-5B/6B-L in Cap Model Area E2	0.37
C-356	11/15/2016	11/23/2016	D	7 CMUs	Topsoil	25-foot wide topsoil cap types in RA-D adjacent to Outboard Area	0.87
C-357	11/21/2016	11/29/2016	D	37B	Topsoil	Cap Type F-5A-J in Cap Model Area D-East	0.63
C-358	11/28/2016	11/29/2016	D	37	Multiple	Sand-GAC, Coarse Gravel, and Sand layers in Cap Type F-3B-J	0.06
C-359	11/21/2016	11/29/2016	D	43	Topsoil	Cap Type T-5A/6A-Q in Cap Model Area OB-East	4.97
C-360	11/22/2016	11/29/2016	D	41B	Topsoil	Cap Type U-5A/6A-P in Cap Model Area OB-Center	0.32
SS-01	3/6/2014	11/7/2014	WB1-8	NA	Coarse and Graded Gravel	Shoreline Stabilization Area 01	1.07
SS-02	4/7/2014	11/7/2014	WB1-8	NA	Coarse and Graded Gravel	Shoreline Stabilization Area 02	5.03
SS-03	9/22/2014	11/7/2014	WB1-8	NA	Coarse and Graded Gravel	Shoreline Stabilization Area 04	3.66
SS-04	10/24/2014	11/7/2014	WB1-8	NA	Coarse and Graded Gravel	Shoreline Stabilization Area 05	3.02

Table 5-9
Lane Capping Completion Summary

Form No.	Date Submitted	Date Approved	RA	CMU(s)	Material	Location	Area (acres)
SS-05	11/14/2014	2/5/2015	WB1-8	NA	Coarse and Graded Gravel	Shoreline Stabilization Area 06	6.86
SS-07	5/16/2016	6/20/2016	B	NA	Fine Gravel,Gravelly Cobble,Bank Run	Mod. Detail 5; shoreline adjacent to RA-B/CMUs 6A and 6C	0.81
SS-08	5/31/2016	6/15/2016	WB1-8	NA	Coarse Gravel	Shoreline Stabilization Area 03, north of WB1-8 Connected Wetland	1.91
SS-09	5/16/2016	6/20/2016	C	NA	Fine Gravel,Gravelly Cobble,Bank Run	Mod. Detail 5; shoreline adjacent to RA-C/CMU 3	0.59
SS-10	8/4/2016	8/9/2016	C	NA	Fine Gravel,Gravelly Cobble,Bank Run	Mod. Detail 5; shoreline adjacent to RA-C/CMU 25	0.15
SS-13	10/27/2016	10/31/2016	D	40	Coarse Cobble	RA-D Outboard Area Berm C	0.47
SS-14	10/27/2016	10/31/2016	D	41A	Coarse Cobble	RA-D Outboard Area Berm D	0.30
SS-15	10/27/2016	11/3/2016	D	39	Coarse Cobble	RA-D Outboard Area Berm B	0.27
SS-16	11/9/2016	11/15/2016	D	22	Coarse Cobble	RA-D Outboard Area Berm A	0.34
SS-17	11/9/2016	11/15/2016	E	43	Coarse Cobble	RA-D Outboard Area Berm F	0.34
SS-18	11/16/2016	11/30/2016	D	43	Coarse Cobble	RA-D Outboard Area Berm E	0.09
SS-19	11/28/2016	11/30/2016	D	NA	Topsoil	RA-D Eastern Naturalized Shoreline Area	0.14
SS-20	11/28/2016	11/30/2016	D	NA	Topsoil	RA-D Western Naturalized Shoreline Area	0.23
SS-21	11/29/2016	11/30/2016	C	NA	Topsoil	Detail 4; shoreline adjacent to RA-C/CMU 10	0.48
SS-22	11/29/2016	12/5/2016	C	NA	Bank Run	Detail 4; shoreline adjacent to RA-C/CMUs 5 and 25	0.05

Notes:
CMU - Cap Management Unit
GAC - granular activated carbon
NA - not applicable
RA - Remediation Area
SMU - Sediment Management Unit

Table 5-10
CMU Completion Form Summary

CMU Form No.	Date Submitted	Date Approved	RA	CMU	Size (acres)	Cap Type	Applicable Layers	Applicable Lane Completion Forms
0001	11/16/2012	12/11/2012	SMU 8	4	3.82	W-00-0	Thin Layer Cap (Medium Sand)	C015, C016, C017, C018, C019
0002	11/16/2012	12/12/2012	SMU 8	1	11.98	W-00-0	Thin Layer Cap (Medium Sand)	C025
0003	8/28/2013	1/15/2014	SMU 8	3	3.78	W-00-0	Thin Layer Cap (Medium Sand)	C019, C020, C021, C023
0005	10/21/2014	12/1/2015	D	43A	0.82	T-6A-Q	Sand-GAC, Coarse Gravel, Topsoil	C-089
0006	3/2/2015	3/6/2015	E	4	12.96	E-1-K	Medium Sand	C-099
0007	3/2/2015	3/6/2015	E	5A	4.75	C-2A-K	Medium Sand, Fine Gravel	C-033, C-101
0008	3/3/2015	3/6/2015	E	2	10.08	CC-2A-M	Sand-GAC, Fine Gravel	C-032, C-104
0009	4/6/2015	4/15/2015	E	1	6.59	S-1-R	Sand-GAC, Medium Sand	C-031, C-102
0010	3/17/2015	7/1/2015	D	10A	1.38	J-1/2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-047, C-065, C-106
0011	3/17/2015	5/6/2015	D	11A	4.22	J-1/2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-047, C-054, C-065, C-066, C-106
0012	3/17/2015	5/6/2015	D	12A	5.61	J-1/2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-054, C-055, C-057, C-066, C-067, C-106
0013	3/17/2015	5/27/2015	D	13A	3.88	J-1/2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-055, C-057, C-067, C-068, C-106
0015	4/2/2015	4/15/2015	E	12	6.54	S-1-R	Sand-GAC, Medium Sand	C-034, C-103
0016	4/17/2015	4/30/2015	E	8	6.90	CC-2A-M	Sand-GAC, Fine Gravel	C-035, C-037, C-105
0017	4/17/2015	4/30/2015	E	8A	0.32	CC-2A-M	Sand-GAC, Fine Gravel	C-035, C-037, C-105
0018	6/30/2015	6/30/2015	A	1	29.5	E-1-A	Medium Sand	C-109
0019	10/27/2015	10/28/2015	A	2A	17.3	D-2A-A	Medium Sand	C-110
0020	11/30/2015	12/3/2015	A	7	1.38	J-2A-B	Sand-Siderite, Sand-GAC, Medium Sand	C-090, C-124, C-139
0021	3/10/2016	3/23/2016	D	5	3.2	J-1/2A-G, JJ-2A-G	Sand-Siderite, Sand-GAC, Medium Sand	C-063, C-064, C-079, C-091, C-097, C-152
0022	1/29/2016	2/25/2016	D	6A	2.5	J-1/2A-G	Sand-Siderite, Sand-GAC, Medium Sand	C-064, C-079, C-091, C-152
0023	1/7/2016	1/13/2016	A	11A	1.85	U-6A-B	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-094, C-113, C-124, C-126, C-154, C-154 Addendum, C-162
0024	3/9/2016	3/23/2016	C	1	0.63	J-2A-D	Sand-Siderite, Sand-GAC, Medium Sand	C-121, C-138, C-156, C-163
0025	1/29/2016	2/10/2016	C	4A	1.93	J-1/2A-E	Sand-Siderite, Sand-GAC, Medium Sand	C-121, C-134, C-149
0026	2/3/2016	2/10/2016	A	6A	0.13	A-5A-A	Medium Sand, Coarse Gravel, Topsoil	C-096, C-122, C-123
0030	3/17/2016	3/23/2016	SMU 8	46	8.21	Amended TLC Model Area A	Sand-GAC	C-169
0031	3/2/2016	3/2/2016	A	3	2.39	C-2A-A	Medium Sand, Fine Gravel	C-086, C-095, C-166
0032	3/17/2016	4/6/2016	D	35A	2.10	M-2A-J	Sand-Siderite, Sand-GAC, Fine Gravel	C-059, C-070, C-071, C-082, C-108
0033	3/17/2016	3/23/2016	SMU 8	47	8.89	Amended TLC Model Area B	Sand-GAC	C-165
0035	3/23/2016	3/24/2016	D	35B	2.07	M-2A-J	Sand-Siderite, Sand-GAC, Fine Gravel	C-056, C-071, C-082, C-111, C-118, C-132, C-170
0036	3/24/2016	3/29/2016	A	9A	2.67	F-3A/5A/6A-B	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-090, C-094, C-124, C-126, C-143, C-154, C-154 Addendum 2, C-173
0037	3/17/2016	3/23/2016	E	17	1.20	N-3B/5B-K	Gravelly Sand, Gravelly Cobble, Coarse Gravel	C-136, C-174
0038	3/30/2016	4/14/2016	A	4A	2.22	B-3A-A	Medium Sand, Fine Gravel	C-086, C-095, C-167
0039	3/23/2016	3/24/2016	A	4B	2.78	Modified B(2)-3A-A	Medium Sand, Fine and Coarse Gravel	C-085, C-095, C-096, C-168
0040	4/1/2016	4/6/2016	D	11B	2.56	J-1/2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-053, C-054, C-066, C-069, C-084, C-175
0041	3/30/2016	4/6/2016	D	44	1.17	RA-D-1B	Sand-Siderite-GAC Monolayer	C-191
0042	4/4/2016	4/6/2016	E	24	1.58	R-1-L	Sand-GAC, Medium Sand	C-058, C-078, C-140, C-181
0043	4/4/2016	4/7/2016	E	25	2.25	S-1-R	Sand-GAC, Medium Sand	C-137, C-181
0044	4/4/2016	4/7/2016	E	5B	5.28	C-2A-K	Medium Sand, Fine Gravel	C-033, C-100, C-185
0045	4/4/2016	4/7/2016	A	2B	1.31	D-2A-A	Medium Sand	C-159
0046	4/4/2016	4/7/2016	E	19	2.79	QQ-2A-M	Gravelly Sand-GAC, Gravelly Cobble	C-130, C-178
0048	4/4/2016	4/7/2016	D	12B	2.49	J-2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-054, C-057, C-059, C-066, C-071, C-072, C-073, C-082, C-175
0049	4/6/2016	4/11/2016	E	20	4.18	Q-2A-K	Gravelly Sand, Gravelly Cobble	C-115, C-119, C-187

Table 5-10
CMU Completion Form Summary

CMU Form No.	Date Submitted	Date Approved	RA	CMU	Size (acres)	Cap Type	Applicable Layers	Applicable Lane Completion Forms
0051	4/14/2016	4/18/2016	SMU 8	1,2	5.25	W-00-0	Thin Layer Cap (Medium Sand)	C-038, C-043, C-064, C-080, C-088
0052	4/18/2016	4/20/2016	C	15	3.67	J-1/2A-F	Sand-Siderite, Sand-GAC, Medium Sand	C-063, C-064, C-080, C-091, C-092, C-152, C-180
0053	4/20/2016	5/11/2016	E	10	0.44	E-1-K	Medium Sand	C-099, C-158
0054	5/11/2016	5/12/2016	C	11A	4.18	J-1/2A-F	Sand-Siderite, Sand-GAC, Medium Sand	C-007, C-008, C-011, C-012, C-080, C-092, C-180
0055	4/20/2016	4/21/2016	D	19A	0.72	M-2A-H	Sand-Siderite, Sand-GAC, Fine Gravel	C-038, C-048, C-177
0056	4/20/2016	4/21/2016	D	23	2.73	M-2A-I	Sand-Siderite, Sand-GAC, Fine Gravel	C-036, C-039, C-040, C-046, C-049, C-177
0057	4/20/2016	4/25/2016	D	27	0.88	M-2A-I	Sand-Siderite, Sand-GAC, Fine Gravel	C-039, C-040, C-045, C-049, C-177
0058	4/20/2016	4/25/2016	D	29A	3.89	M-2A-I	Sand-Siderite, Sand-GAC, Fine Gravel	C-039, C-040, C-045, C-047, C-049, C-050, C-052, C-059, C-084, C-177
0059	4/20/2016	4/25/2016	D	32	2.85	M-2A-I	Sand-Siderite, Sand-GAC, Fine Gravel	C-047, C-050, C-052, C-060, C-061, C-070, C-082, C-177
0060	4/27/2016	5/2/2016	E	13A	0.94	QQ-3B-M	Gravelly Sand-GAC, Gravelly Cobble	C-151, C-193
0061	4/27/2016	4/28/2016	E	14	1.70	NN-3B/5B-M	Gravelly Sand-GAC, Gravelly Cobble, Coarse Gravel	C-145, C-176
0062	5/6/2016	5/11/2016	A	4C	0.28	Modified B-3A-A	Medium Sand, Fine Gravel	C-086, C-195
0063	5/6/2016	5/11/2016	D	26	0.36	F-3B-I, -U	Sand-Siderite, Sand-GAC, Coarse Gravel, Sand	C-039, C-040, C-049, C-087, C-183
0064	5/9/2016	5/11/2016	D	30	3.26	H-3B-I, -U	Sand-Siderite, Sand-GAC, Fine Gravel	C-039, C-040, C-047, C-049, C-050, C-052, C-059, C-070, C-082, C-084, C-186
0065	5/6/2016	5/11/2016	E	15	1.67	Q-3B-K	Gravelly Sand, Gravelly Cobble	C-115, C-136, C-192
0066	5/12/2016	5/16/2016	D	29B	0.32	M-2A-I	Sand-Siderite, Sand-GAC, Fine Gravel	C-040, C-042, C-049, C-083, C-085, C-220
0067	5/12/2016	5/16/2016	D	25	0.29	H-3B-I, -U	Sand-Siderite, Sand-GAC, Fine Gravel	C-039, C-040, C-049, C-184
0068	5/13/2016	5/16/2016	A	4D	0.24	Modified B-3A-A	Medium Sand, Fine Gravel	C-095, C-171
0069	5/17/2016	5/18/2016	B	4	1.86	RA-B-1C	Sand-Siderite-GAC Monolayer	C-213
0070	5/17/2016	5/18/2016	B	5	1.17	RA-B-1C	Sand-Siderite-GAC Monolayer	C-241
0071	5/17/2016	5/18/2016	B	9	0.86	RA-B-1D	Sand-Siderite-GAC Monolayer	C-223
0072	5/17/2016	5/31/2016	B	10	0.69	RA-B-1D	Sand-Siderite-GAC Monolayer	C-212
0073	5/19/2016	5/24/2016	E	3	2.70	PP-2B-M	Sand-GAC, Coarse Gravel	C-032, C-141, C-142, C-144, C-211
0074	5/19/2016	5/24/2016	E	21	2.80	PP-2B-M	Sand-GAC, Coarse Gravel	C-035, C-037, C-128, C-140, C-142, C-211
0075	5/19/2016	5/24/2016	E	30A	1.64	PP-2B-L	Sand-GAC, Coarse Gravel	C-127, C-140, C-219
0076	5/19/2016	5/24/2016	E	22	8.27	OO-3B-M	Gravelly Sand-GAC, Gravelly Cobble	C-128, C-129, C-218
0077	5/23/2016	5/24/2016	D	12C	1.13	J-1-J	Sand-Siderite, Sand-GAC, Medium Sand	C-053, C-054, C-066, C-067, C-069, C-216
0078	5/26/2016	6/1/2016	E	18	3.29	CC-2A-M	Sand-GAC, Fine Gravel	C-142, C-222
0079	5/31/2016	6/6/2016	E	26	3.50	CC-2A-M	Sand-GAC, Fine Gravel	C-058, C-078, C-140, C-222
0080	5/26/2016	6/1/2016	E	29A	0.83	CC-2A-M	Sand-GAC, Fine Gravel	C-140, C-222
0081	5/26/2016	6/1/2016	E	20B	0.58	Q-3B-K	Gravelly Sand, Gravelly Cobble	C-114, C-226
0082	6/3/2016	6/6/2016	E	27,28	4.3	MERC1-00-W, -X; MERC2-00-Y	Gravelly Sand-GAC	C-125
0083	6/7/2016	6/9/2016	C	11B	0.26	J-1/2A-F	Sand-Siderite, Sand-GAC, Medium Sand	C-006, C-010, C-202
0084	6/7/2016	6/9/2016	C	11C	0.71	J-1/2A-F	Sand-Siderite, Sand-GAC, Medium Sand	C-006, C-008, C-009, C-180
0085	6/29/2016	7/7/2016	C	11D	0.16	J-1/2A-F	Sand-Siderite, Sand-GAC, Medium Sand	C-006, C-008, C-010, C-180, C-202
0086	6/8/2016	6/9/2016	C	21	5.6	SMU8 TLC	Medium Sand	C-257
0087	6/7/2016	6/13/2016	C	20	1.06	GAC Direct	GAC Direct Application	C-268
0088	6/7/2016	6/9/2016	C	16	0.44	RA-C-1B	GAC Direct Application	C-261
0089	6/8/2016	6/9/2016	C	17	0.9	RA-C-1C	GAC Direct Application	C-261
0090	6/9/2016	6/14/2016	B	7	2.7	U-3A/6A-N	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-120, C-120 Addendum 2, C-148, C-161, C-256
0091	6/10/2016	6/13/2016	B	17	0.05	RA-B-1F	Sand-Siderite-GAC Monolayer	C-253
0092	6/10/2016	6/16/2016	E	9	1.44	Q-3B-K	Gravelly Sand, Gravelly Cobble	C-203, C-230

Table 5-10
CMU Completion Form Summary

CMU Form No.	Date Submitted	Date Approved	RA	CMU	Size (acres)	Cap Type	Applicable Layers	Applicable Lane Completion Forms
0093	6/10/2016	6/14/2016	D	18	0.84	H-3B-I	Sand-Siderite, Sand-GAC, Fine Gravel	C-036, C-038, C-046, C-214
0094	6/14/2016	6/15/2016	A	6B	9.41	A-(3-to-6)A-A	Medium Sand, Coarse Gravel, Topsoil	C-095, C-096, C-096 Addendum, C-112, C-133, C-143, C-221
0095	6/14/2016	6/16/2016	B	8	0.80	ModH-2A/3A-D	Sand-Siderite, Sand-GAC, Fine Gravel	C-204, C-235, C-262
0096	6/15/2016	6/20/2016	D	20A	1.05	H-3B-H	Sand-Siderite, Sand-GAC, Fine Gravel	C-038, C-045, C-048, C-049, C-227
0097	6/21/2016	6/22/2016	E	6	1.76	P-2B-K	Medium Sand, Coarse Gravel	C-033, C-182, C-225
0098	7/13/2016	7/20/2016	C	18	0.5	RA-C-1D	Sand-Siderite-GAC Monolayer, Medium Sand	C-274
0099	6/24/2016	6/27/2016	E	7	9.14	O-3B-K	Gravelly Sand, Gravelly Cobble	C-182, C-258, C-269
0100	6/24/2016	6/27/2016	C	12	0.98	H-2A/3B-F	Sand-Siderite, Sand-GAC, Fine Gravel	C-008, C-063, C-080, C-091, C-092, C-098, C-229
0101	6/24/2016	6/27/2016	C	13	0.10	L-3B-F	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-063, C-091, C-093, C-098, C-207, C-243
0102	7/6/2016	7/7/2016	E	11	12.09	OO-3B-M	Gravelly Sand-GAC, Gravelly Cobble	C-141, C-142, C-144, C-252
0103	6/29/2016	6/30/2016	C	22	0.36	RA-C-2B	Sand-Siderite-GAC Monolayer	C-278
0104	6/29/2016	6/30/2016	D	31	0.76	F-3B-I	Sand-Siderite, Sand-GAC, Coarse Gravel, Sand	C-045, C-047, C-052, C-060, C-082, C-087, C-194, C-250
0105	6/30/2016	6/30/2016	D	28A	0.10	F-3B-I	Sand-Siderite, Sand-GAC, Coarse Gravel, Sand	C-045, C-049, C-087, C-275
0106	6/30/2016	6/30/2016	C	2	1.30	H-2A/3B-D	Sand-Siderite, Sand-GAC, Fine Gravel	C-121, C-156, C-239
0107	6/30/2016	7/6/2016	E	32	3.39	O-3B-K	Gravelly Sand, Gravelly Cobble	C-114, C-270
0108	6/30/2016	7/5/2016	C	3	1.15	L-3B/5B-D	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-121, C-156, C-210, C-240
0109	7/6/2016	7/7/2016	A	8B	2.67	H-3A-B	Sand-Siderite, Sand-GAC, Fine Gravel	C-090, C-094, C-124, C-126, C-266
0110	7/6/2016	7/7/2016	A	9B	2.07	F-3A/5A-B	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-090, C-094, C-116, C-124, C-126, C-143, C-154, C-277
0111	7/20/2016	7/26/2016	D	8	2.00	J-1/2A-I	Sand-Siderite, Sand-GAC, Medium Sand	C-036, C-043, C-046, C-081, C-242
0112	7/20/2016	7/25/2016	D	9	2.22	J-1/2A-I	Sand-Siderite, Sand-GAC, Medium Sand	C-040, C-042, C-043, C-049, C-081, C-083, C-085, C-242
0113	8/4/2016	8/10/2016	D	10B	2.46	J-1/2A-I, -J	Sand-Siderite, Sand-GAC, Medium Sand	C-042, C-047, C-052, C-053, C-065, C-069, C-083, C-085, C-106, C-175, C-242
0114	7/6/2016	7/7/2016	D	45	7.55	RA-D-1A	Sand-Siderite, Sand-GAC, Medium Sand	C-153, C-217, C-293
0115	7/21/2016	7/26/2016	D	13B	7.03	J-1/2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-055 to C-059, C-068, C-071 to C-073, C-076, C-078, C-082, C-118, C-247
0116	7/21/2016	7/26/2016	D	14	9.69	J-1/2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-056, C-058, C-059, C-062, C-068, C-076, C-078, C-111, C-118, C-132, C-215, C-247
0117	7/20/2016	7/26/2016	D	15	2.02	J-1/2A-J	Sand-Siderite, Sand-GAC, Medium Sand	C-111, C-118, C-132, C-197, C-215, C-247
0118	7/6/2016	7/7/2016	B	3	0.66	RA-B-1B	Sand-Siderite, Sand-GAC, Medium Sand	C-199, C-238, C-294
0119	7/7/2016	7/7/2016	F	2	0.48	D-2A-T	Medium Sand	C-280
0120	7/8/2016	7/19/2016	D	24A	1.97	H-3B-I, -U	Sand-Siderite, Sand-GAC, Fine Gravel	C-036, C-039, C-040, C-045, C-046, C-049, C-082, C-273
0121	7/8/2016	7/19/2016	B	1	2.86	RA-B-1A	Sand-Siderite, Sand-GAC, Medium Sand	C-157, C-228, C-234, C-292
0122	7/8/2016	7/19/2016	A	9C	1.94	F-3A/5A-B	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-090, C-094, C-116, C-124, C-126, C-143, C-154, C-296
0123	7/8/2016	7/19/2016	A	11B	0.47	U-6A-B	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-094, C-126, C-154, C-303
0124	7/13/2016	7/19/2016	D	34A	2.21	F-3B-I	Sand-Siderite, Sand-GAC, Coarse Gravel, Sand	C-070, C-071, C-082, C-251, C-281
0125	7/19/2016	7/20/2016	C	23	0.67	RA-C-2C	Sand-Siderite-GAC Monolayer, Medium Sand	C-283, C-287
0126	7/19/2016	7/26/2016	F	1	0.15	D-2A-T	Medium Sand	C-279, C-321, C-322
0127	7/27/2016	8/1/2016	E	16	14.27	O-3B-K	Gravelly Sand, Gravelly Cobble	C-115, C-146, C-237
0128	7/27/2016	8/9/2016	E	13B	0.70	QQ-3B-M	Gravelly Sand-GAC, Gravelly Cobble	C-150, C-301
0129	7/21/2016	7/26/2016	SMU 8	19	0.70	RA-C-1A Transition	Medium Sand	C-295
0130	7/21/2016	7/26/2016	C	24	0.31	RA-C-2D	GAC and Siderite Direct Application	C-310
0131	7/20/2016	7/21/2016	B	13B	0.26	ModJ-2A-D	Sand-Siderite, Sand-GAC, Medium Sand	C-157, C-264, C-306
0132	7/20/2016	7/21/2016	B	13A	0.83	ModJ-1/2A-D	Sand-Siderite, Sand-GAC, Medium Sand	C-157, C-231, C-306
0133	7/27/2016	8/1/2016	B	12	0.18	ModL-3A-D	Sand-Siderite, Sand-GAC, Coarse Gravel	C-164, C-205, C-308
0134	7/27/2016	8/1/2016	B	14	0.41	ModH-2A/3A-D	Sand-Siderite, Sand-GAC, Fine Gravel	C-157, C-157 Addendum, C-264, C-309

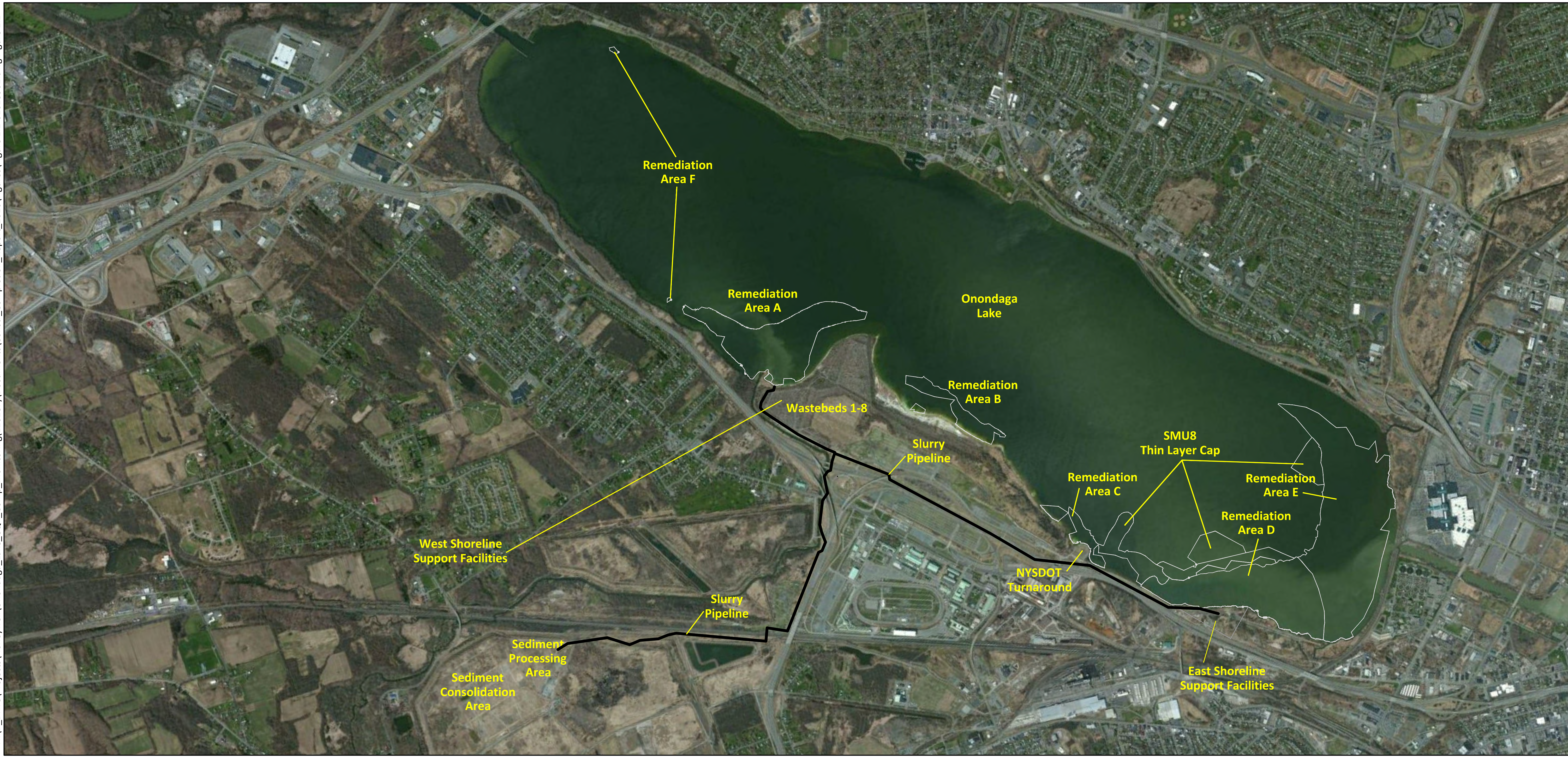
Table 5-10
CMU Completion Form Summary

CMU Form No.	Date Submitted	Date Approved	RA	CMU	Size (acres)	Cap Type	Applicable Layers	Applicable Lane Completion Forms
0135	7/27/2016	8/1/2016	B	15	0.34	ModL-3A-D	Sand-Siderite, Sand-GAC, Coarse Gravel	C-201, C-263, C-264
0136	7/27/2016	8/9/2016	A	8A	4.51	H-2A/3A-B	Sand-Siderite, Sand-GAC, Fine Gravel	C-090, C-094, C-124, C-126, C-179
0137	7/27/2016	8/9/2016	B	11	0.33	ModH-2A/3A-D	Sand-Siderite, Sand-GAC, Fine Gravel	C-200, C-233, C-307
0138	7/26/2016	7/27/2016	C	9	0.70	RA-C-1A	Sand-Siderite, Sand-GAC, Medium Sand	C-245, C-289, C-324
0139	7/26/2016	8/1/2016	B	2	3.41	J-1/2A-C	Sand-Siderite, Sand-GAC, Medium Sand	C-196, C-267, C-299
0140	7/26/2016	8/1/2016	B	16	0.43	J-1/2A-D	Sand-Siderite, Sand-GAC, Medium Sand	C-196, C-254, C-276
0141	7/27/2016	8/9/2016	C	8	0.24	RA-C-2A Transition	Medium Sand	C-284
0142	7/26/2016	7/27/2016	E	23	8.98	O-3B-K	Gravelly Sand, Gravelly Cobble	C-114, C-131, C-259
0143	7/26/2016	7/27/2016	E	34A	2.70	NN-3B/5B-L	Gravelly Sand-GAC, Gravelly Cobble, Coarse Gravel	C-160, C-249, C-315
0144	7/26/2016	7/27/2016	E	35	0.26	OO-3B-L	Gravelly Sand-GAC, Gravelly Cobble	C-160, C-317
0145	7/27/2016	8/9/2016	A	10	0.66	I-2B/3B-B	Sand-Siderite, Sand-GAC, Coarse Gravel	C-094, C-124, C-126, C-304
0146	8/10/2016	8/11/2016	B	6B	0.42	L-3A/5A-D	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-155, C-206, C-246, C-265, C-282
0147	8/11/2016	8/24/2016	B	6D	0.56	L-3A/5A-D	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-120, C-155, C-206, C-255, C-260, C-291, C-314
0148	8/1/2016	8/9/2016	D	35C	0.79	M-2A-J	Sand-Siderite, Sand-GAC, Fine Gravel	C-111, C-118, C-132, C-172, C-197, C-208, C-215, C-232
0149	8/1/2016	8/9/2016	D	36A	1.78	H-3B-J	Sand-Siderite, Sand-GAC, Fine Gravel	C-071, C-082, C-111, C-132, C-312
0150	8/1/2016	8/9/2016	E	36	1.87	OO-3B-M	Gravelly Sand-GAC, Gravelly Cobble	C-127, C-129, C-328
0151	8/2/2016	8/9/2016	C	4B	0.62	J-1/2A-E	Sand-Siderite, Sand-GAC, Medium Sand	C-121, C-284, C-316
0152	8/2/2016	8/9/2016	C	7	1.40	ModJ-1/2A-E	Sand-Siderite, Sand-Siderite-GAC, Medium Sand	C-284, C-316
0153	8/8/2016	8/9/2016	B	6A	2.16	L-3A/5A-D	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-120, C-120 Addendum, C-155, C-209, C-260
0154	8/9/2016	8/10/2016	B	6C	0.67	L-3A/5A-D	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-120, C-155, C-209, C-313
0155	8/9/2016	8/10/2016	E	30B	0.48	PP-2B-L	Sand-GAC, Coarse Gravel	C-140, C-286, C-329
0156	8/9/2016	8/10/2016	B	6E	0.24	L-3A/5A-D	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-120, C-155, C-264, C-302, C-323
0157	8/9/2016	8/10/2016	C	5	0.26	ModL-3B-E	Sand-Siderite, Sand-GAC, Coarse Gravel	C-271, C-297, C-336
0158	8/10/2016	8/11/2016	E	29B	0.79	CC-2A-L	Sand-GAC, Fine Gravel	C-140, C-286, C-330
0159	8/11/2016	8/23/2016	D	6C	2.4	ModJ-1/2A-H	Sand-Siderite, Sand-GAC, Medium Sand	C-064, C-079, C-091, C-290, C-305, C-332
0160	8/15/2016	8/23/2016	E	34B	5.09	NN-3B/5B-6B-L	Gravelly Sand-GAC, Gravelly Cobble, Coarse Gravel	C-160, C-286, C-320
0161	8/11/2016	8/24/2016	D	33B	0.39	H-3B-I	Sand-Siderite, Sand-GAC, Fine Gravel	C-060, C-061, C-070, C-082, C-331
0162	12/1/2016	12/6/2016	D	37	1.72	F-3B-J	Sand-Siderite, Sand-GAC, Coarse Gravel, Medium Sand	C-071, C-082, C-111, C-132, C-135, C-197, C-232, C-272, C-326, C-358
0163	8/18/2016	8/23/2016	C	6	0.48	ModH-2A/3B-E	Sand-Siderite, Sand-GAC, Fine Gravel	C-284, C-334
0164	8/18/2016	8/24/2016	D	16	0.45	M-2A-G	Sand-Siderite, Sand-GAC, Fine Gravel	C-063, C-064, C-079, C-091, C-097, C-337
0165	8/17/2016	8/24/2016	D	7	3.5	J-1/2A-H	Sand-Siderite, Sand-GAC, Medium Sand	C-036, C-038, C-043, C-046, C-048, C-074, C-081, C-242, C-298
0166	9/7/2016	9/28/2016	D	6B	2.1	J-1/2A-H	Sand-Siderite, Sand-GAC, Medium Sand	C-064, C-290, C-311, C-325, C-327, C-335, C-349
0167	8/22/2016	8/23/2016	E	31A	4.27	OO-3B-L	Gravelly Sand-GAC, Gravelly Cobble	C-160, C-340
0168	8/18/2016	8/24/2016	C	14	0.19	K-5B-F	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-063, C-091, C-093, C-098, C-207, C-338
0169	8/29/2016	8/31/2016	C	25	0.37	L-5B-E	Sand-Siderite, Sand-GAC, Coarse Gravel, Fine Gravel	C-271, C-297, C-333, C-342
0170	8/26/2016	8/31/2016	D	17	0.76	Multiple	Sand-Siderite, Sand-GAC, Fine Gravel, Coarse Cobble	C-063, C-064, C-079, C-091, C-097, C-339
0171	9/15/2016	9/20/2016	D	48	0.45	Multiple	Sand-Siderite, Sand-GAC, Coarse Cobble, Fine Gravel	C-038, C-041, C-048, C-051, C-087, C-343
0172	9/9/2016	9/19/2016	D	42	0.35	M-2A-J	Sand-Siderite, Sand-GAC, Fine Gravel	C-208, C-232, C-318
0173	8/29/2016	8/31/2016	E	33	5.41	N-3B/5B/6B-K	Gravelly Sand, Gravelly Cobble, Coarse Gravel	C-114, C-248, C-344
0174	9/7/2016	9/19/2016	C	10	1.31	I-3B-E	Sand-Siderite, Sand-GAC, Coarse Gravel	C-004, C-005, C-022, C-030
0175	9/7/2016	9/19/2016	D	19B	0.35	M-2A-H	Sand-Siderite, Sand-GAC, Fine Gravel	C-038, C-041, C-048, C-311, C-327, C-343, C-347
0176	9/7/2016	9/19/2016	D	20B	0.13	H-3B-H	Sand-Siderite, Sand-GAC, Fine Gravel	C-038, C-048, C-311, C-327, C-348

Table 5-10
CMU Completion Form Summary

CMU Form No.	Date Submitted	Date Approved	RA	CMU	Size (acres)	Cap Type	Applicable Layers	Applicable Lane Completion Forms
0177	9/9/2016	9/28/2016	D	21	0.21	F-3B-H	Sand-Siderite, Sand-GAC, Coarse Gravel, Medium Sand	C-038, C-048, C-087, C-311, C-327, C-345
0178	9/13/2016	9/19/2016	D	36B	1.57	H-3B-J	Sand-Siderite, Sand-GAC, Fine Gravel	C-197, C-208, C-215, C-232, C-319
0179	10/4/2016	10/5/2016	E	31B	1.42	OO-3B-L	Gravelly Sand-GAC, Gravelly Cobble	C-160, C-286, C-341
0180	11/3/2016	11/15/2016	D	40	3.77	U-5A/6A/9A-O/P	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-061, C-070, C-071, C-082, C-107, C-190, C-224, C-350, SS-13
0181	11/4/2016	11/15/2016	D	41A	2.32	U-5A/6A-P	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-071, C-082, C-111, C-132, C-189, C-189 Addendum, C-190, C-351, SS-14
0182	11/21/2016	11/30/2016	D	39	3.48	U-5A/6A/9B-O	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-045, C-049, C-051, C-060, C-061, C-077, C-082, C-107, C-190, C-236, C-352, SS-15
0183	11/22/2016	11/30/2016	D	38	0.86	U-3A/5A/6A-O	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-040, C-041, C-044, C-045, C-048, C-049, C-051, C-077, C-353
0184	11/23/2017	11/30/2016	D	34B	0.34	F-5A-I	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-070, C-071, C-082, C-251, C-354
0185	11/23/2016	11/30/2016	E	34C	0.37	NN-5B/6B-L	Gravelly Sand-GAC, Gravelly Cobble, Topsoil	C-160, C-320, C-355
0186	11/29/2016	12/5/2016	D	24B	0.22	H-3B-I	Sand-Siderite, Sand-GAC, Fine Gravel, Topsoil	C-040, C-045, C-049, C-060, C-077, C-082, C-285, C-356
0187	12/7/2016	12/7/2016	D	28B	0.03	F-5A-I	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-045, C-049, C-087, C-087 Addendum, C-356
0188	11/30/2016	12/6/2016	D	22	0.17	G-5A-H	Sand-Siderite, Sand-GAC, Coarse Gravel, Sand or Topsoil	C-038, C-041, C-048, C-051, C-087, C-346, C-356, SS-16
0189	11/29/2016	12/5/2016	D	31B	0.05	F-5A-I	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-060, C-082, C-194, C-356
0190	11/29/2016	12/5/2016	D	33A	0.29	H-3B-I	Sand-Siderite, Sand-GAC, Fine Gravel, Topsoil	C-060, C-061, C-070, C-082, C-285, C-356
0191	11/29/2016	12/5/2016	D	20C	0.15	H-3B-H	Sand-Siderite, Sand-GAC, Fine Gravel, Topsoil	C-038, C-045, C-048, C-049, C-077, C-356
0192	12/1/2016	12/6/2016	D	37B	0.63	F-5A-J	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-071, C-082, C-111, C-132, C-135, C-272, C-357
0193	12/1/2016	12/21/2016	D	41B	0.32	U-5A/6A-P	Sand-Siderite, Sand-GAC, Coarse Gravel, Topsoil	C-111, C-132, C-189, C-360
0194	12/5/2016	12/6/2016	D	43	5.4	T-5A/6A-Q	Sand-GAC, Coarse Gravel, Topsoil	C-147, C-198, C-244, C-359, SS-17, SS-18
0195	2/8/2017	2/8/2017	A	3B	0.15	C-2A-A	Medium Sand, Fine Gravel	C-086, C-110, C-166 Addendum

Notes:
CMU - Cap Management Unit
GAC - Granular Activated Carbon
RA - Remediation Area



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 1.1-01013902.dwg Figure 1.1

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SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

0 2400
Scale in Feet

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Figure 1-1
Site Plan Overview
Construction Completion Report
Onondaga Lake Capping and Dredging

SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

Legend:
Sediment Management Unit (SMU) Boundary
Remediation Area Boundary

0 2000
Scale in Feet

Honeywell

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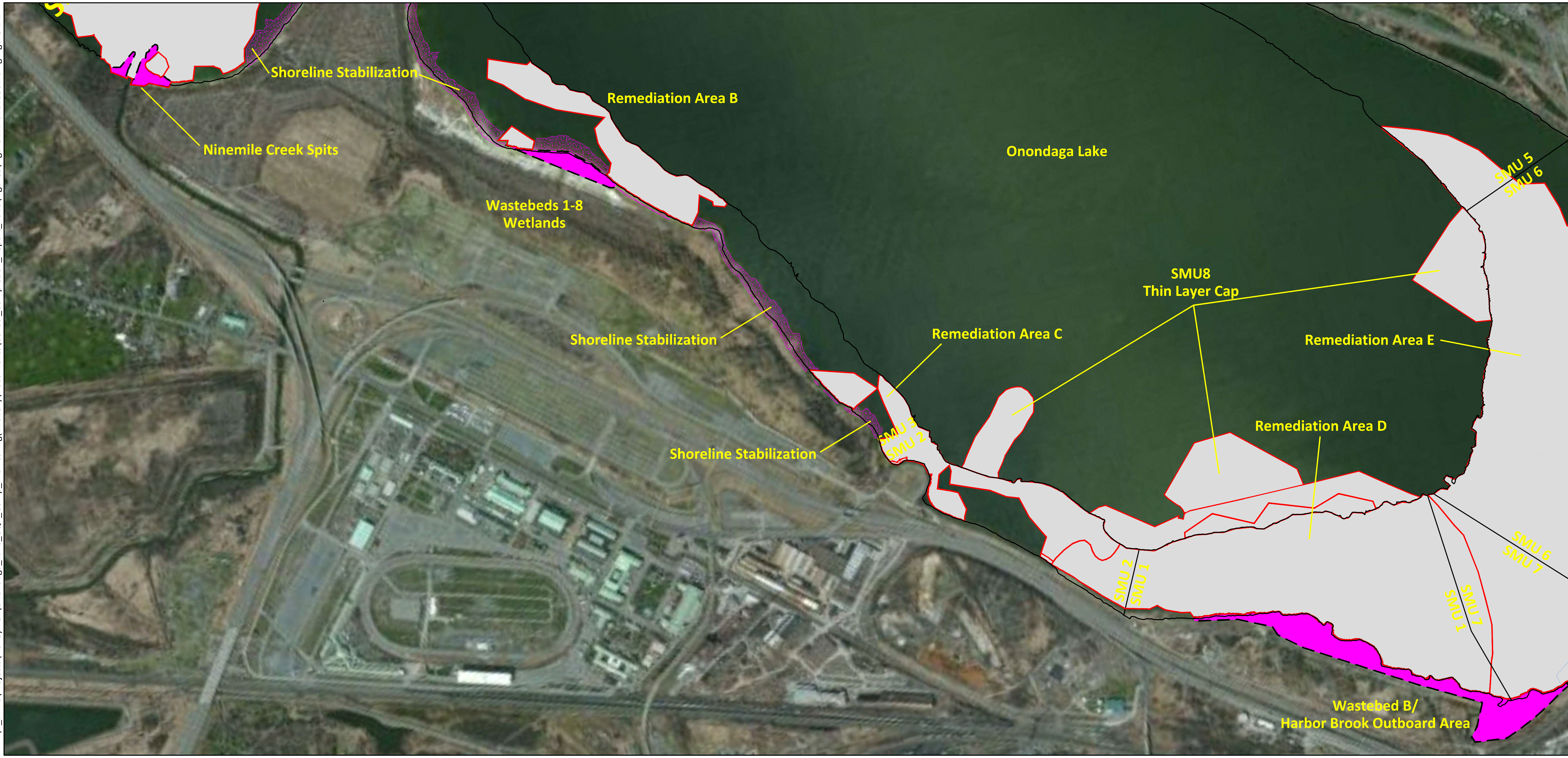
Figure 1-2
Sediment Management Unit and Remediation Area Boundaries
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 2.1-01013902.dwg Figure 2.1

Aug 20, 2017 7:25am cyard

SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

Adjacent Remedial Area
SMU Boundary
Remediation Area Boundary
Shoreline Stabilization Area

0 1000
Scale in Feet

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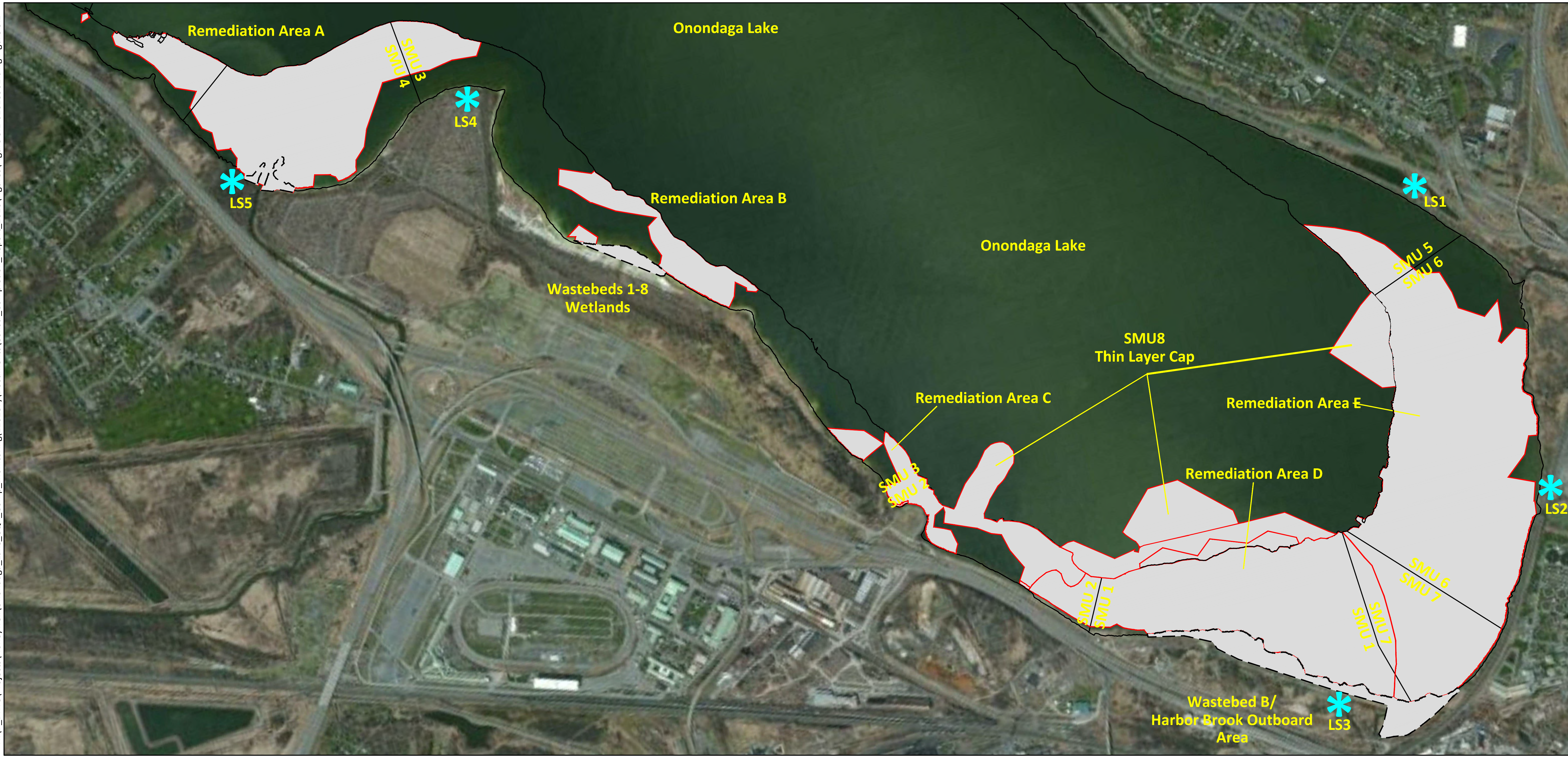
Figure 2-1
Adjacent Remediation Areas
Construction Completion Report
Onondaga Lake Capping and Dredging

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 3.1-01013902.dwg Figure 3.1



SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

Note:
1. Locations Shown are Approximate

LEGEND:

Perimeter Monitoring Location

0 1200
Scale in Feet

Aug 20, 2017 7:33am cyard

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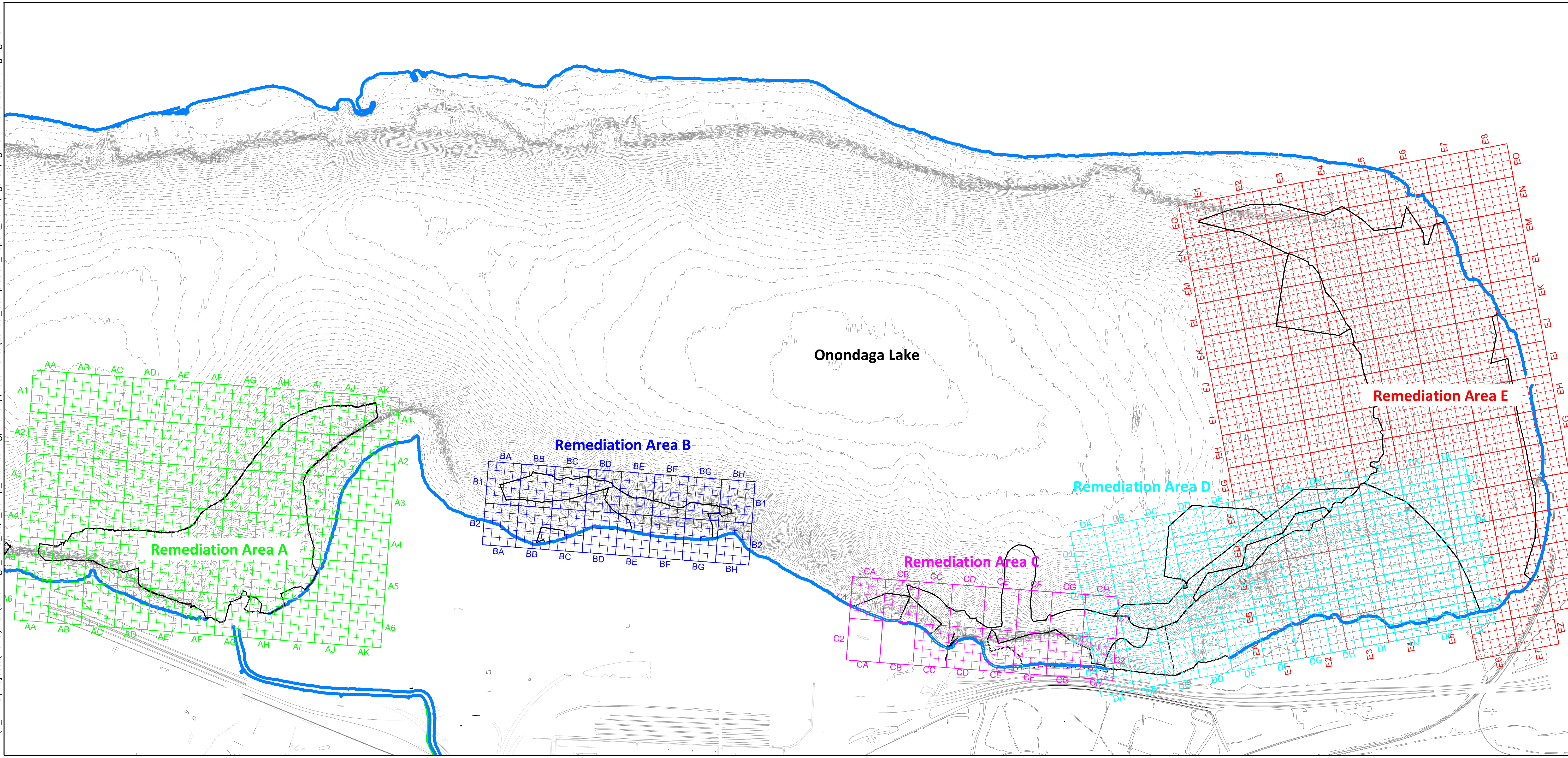
Figure 3-1
Lakeside Air Quality Monitoring Locations
Construction Completion Report
Onondaga Lake Capping and Dredging

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_COA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.1-01013902.dwg Figure 4-1



LEGEND:

HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

Shoreline (elev. 362.5')

A4 Remediation Area A

B2 Remediation Area B

Remediation Area Boundary

C1 Remediation Area C

D1 Remediation Area D

E6 Remediation Area E

0 1200
Scale in Feet

Aug 20, 2017 7:47am cyard

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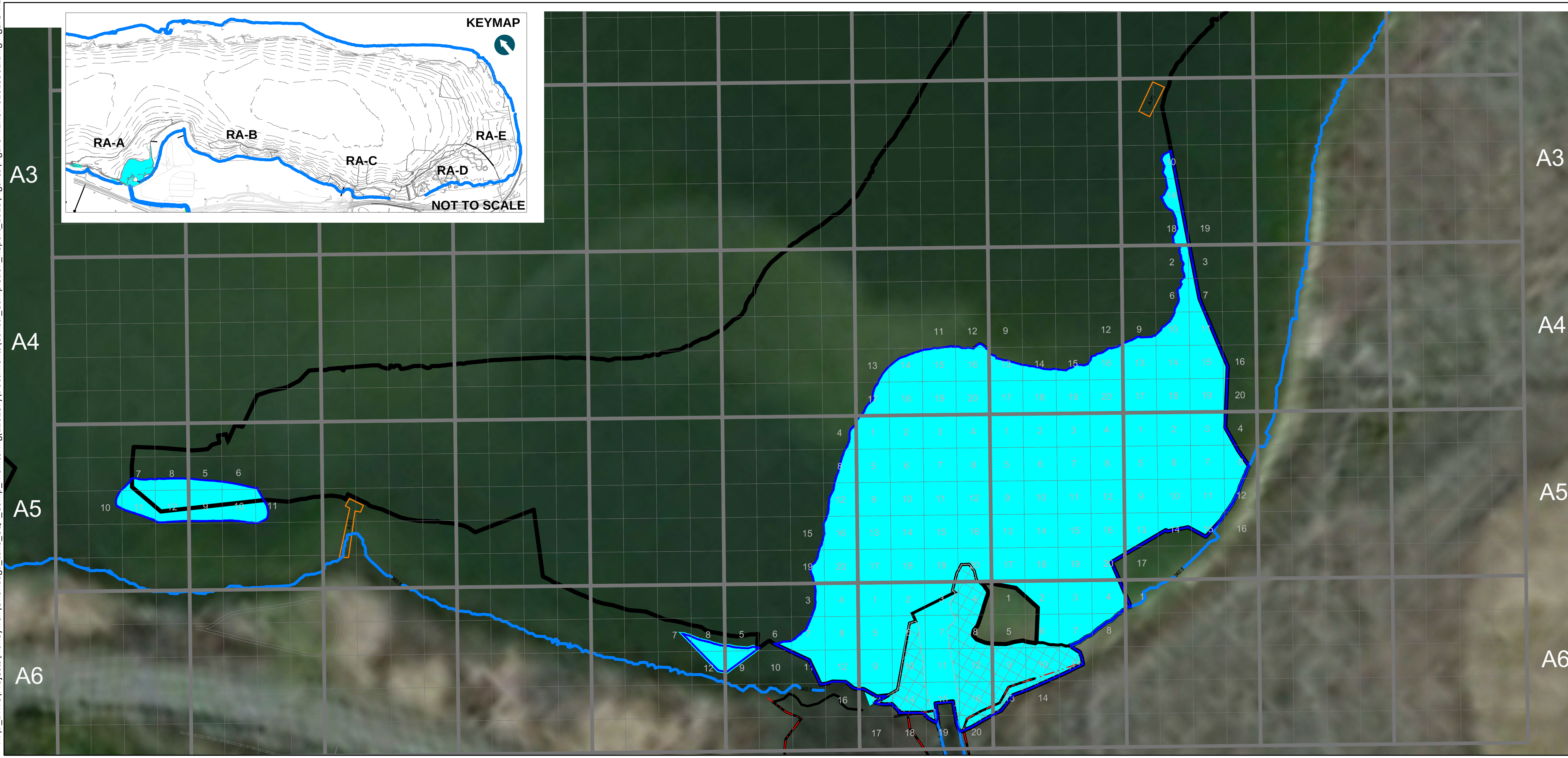
Figure 4-1
DMU Grids
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.2Rev-01013902.dwg Figure 4-2

Aug 20, 2017 8:02am cyard

SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

Shoreline (elev. 362.5')

Dredge Boundary

AE / A2 / 10 — DMU Boundary

Remediation Area Boundary

Dredge Completed and Approved

Ninemile Creek Spits

0 — 300
Scale in Feet

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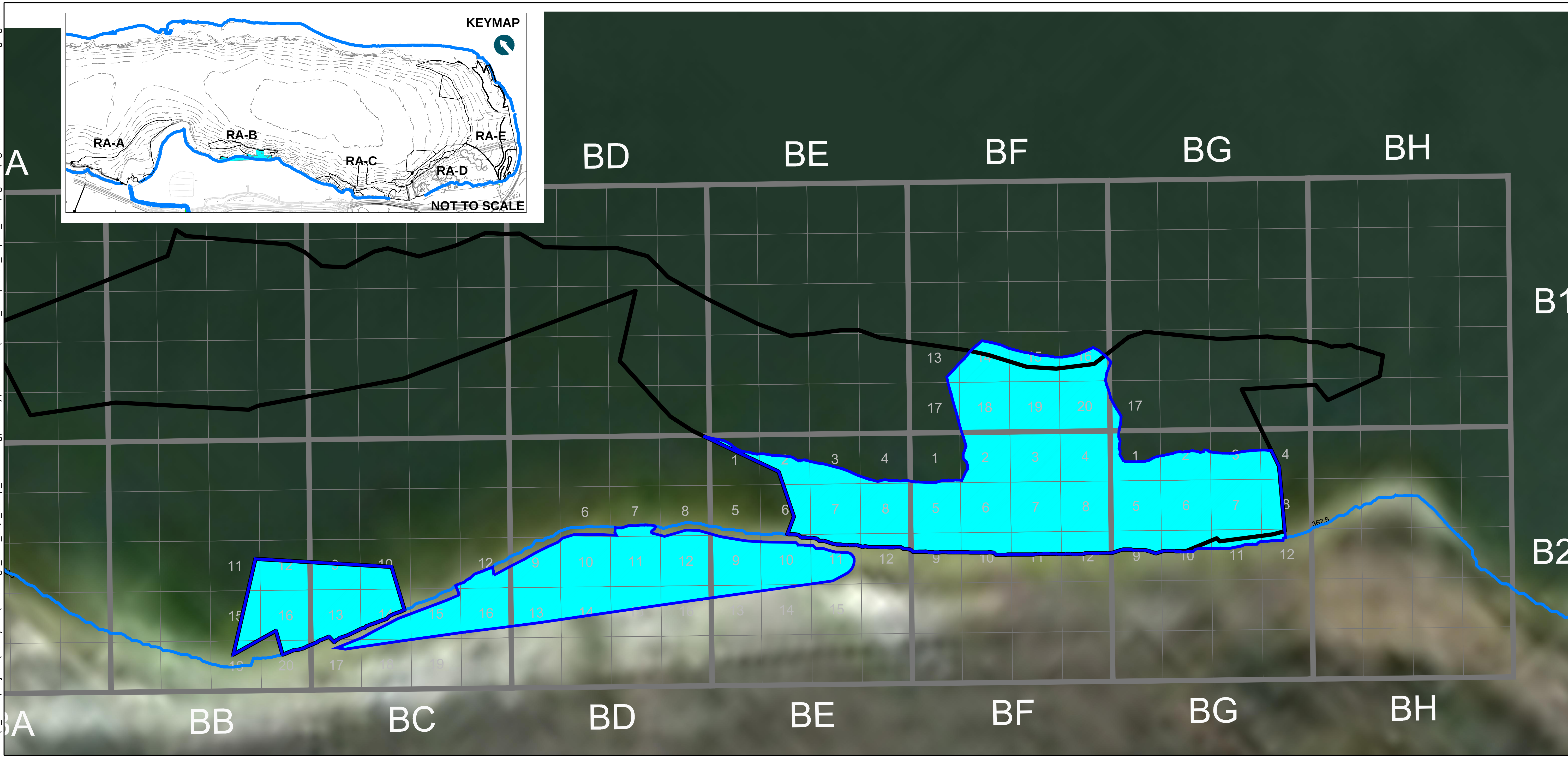
Figure 4-2
Completed DMUs - RA-A
Construction Completion Report
Onondaga Lake Capping and Dredging



SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

Shoreline (elev. 362.5')

Dredge Boundary

BE / B2 / 10 — DMU Boundary

Remediation Area Boundary

Dredge Completed and Approved

0 200
Scale in Feet

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.3REV-01013902.dwg Figure 4-3

Aug 20, 2017 8:19am cyard

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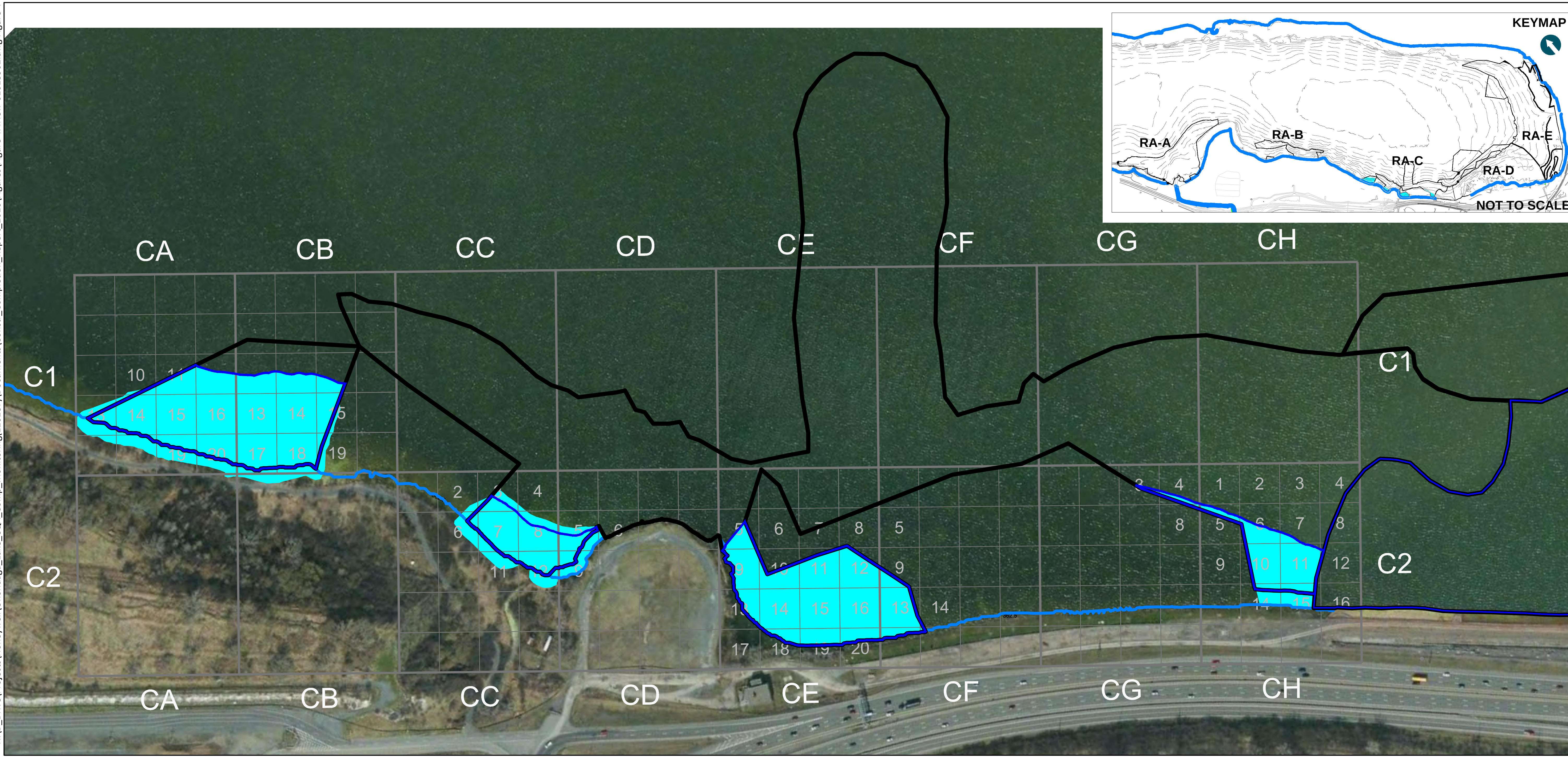
Figure 4-3
Completed DMUs - RA-B
Construction Completion Report
Onondaga Lake Capping and Dredging



SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

- Shoreline (elev. 362.5')
- Dredge Boundary
- CE / C2 / 10 — DMU Boundary
- Remediation Area Boundary
- Dredge Completed and Approved

0 250
Scale in Feet

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.4New-01013902.dwg Figure 4-4

Aug 20, 2017 8:34am cyard

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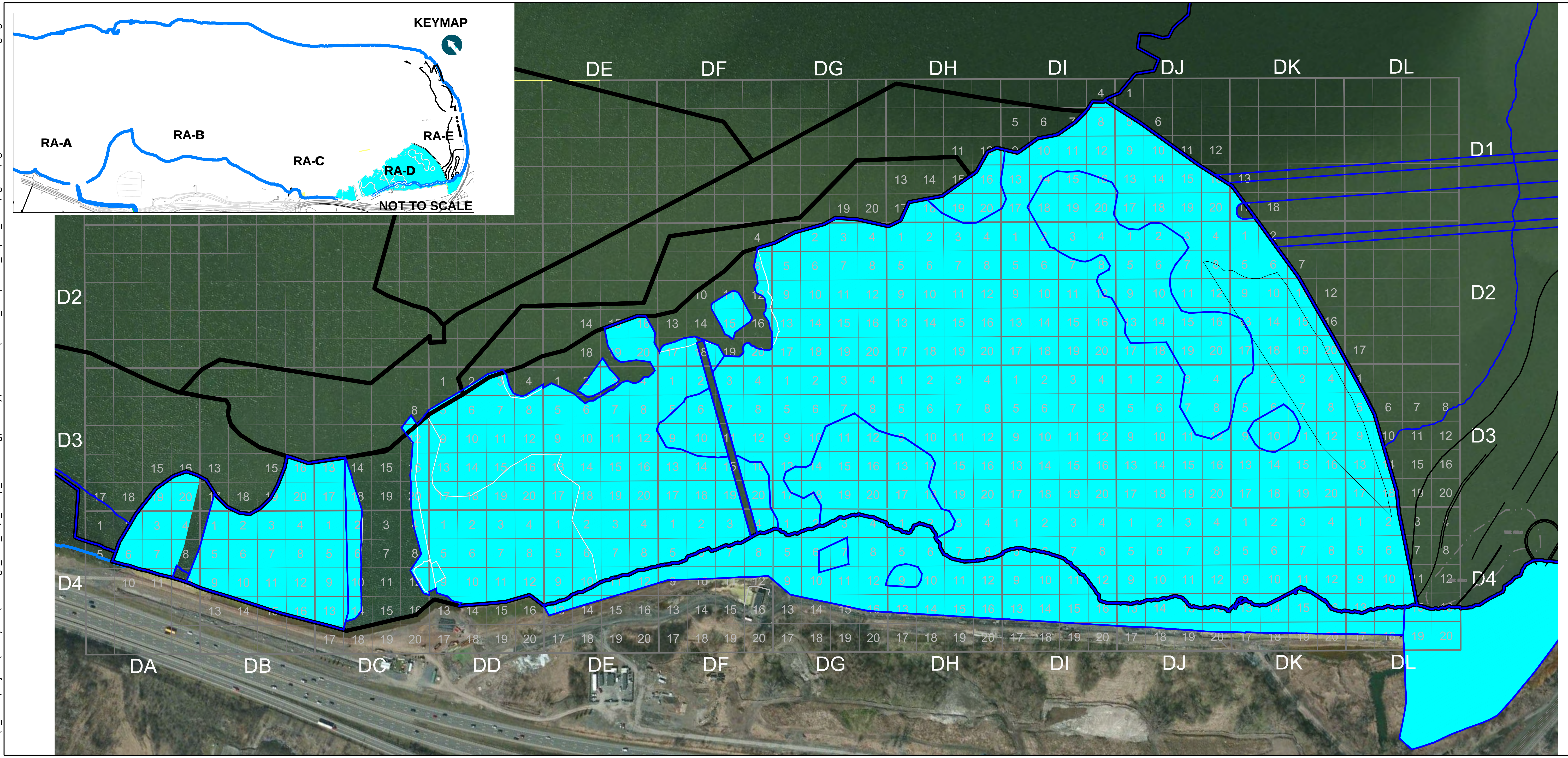
Figure 4-4
Completed DMUs - RA-C
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.5NEW-01013902.dwg Figure 4-5

SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

- Shoreline (elev. 362.5')
- Dredge Boundary
- DE / D2 / 10 — DMU Boundary
- Remediation Area Boundary
- Dredge Completed and Approved

0 350
Scale in Feet

Aug 20, 2017 8:47am cyard

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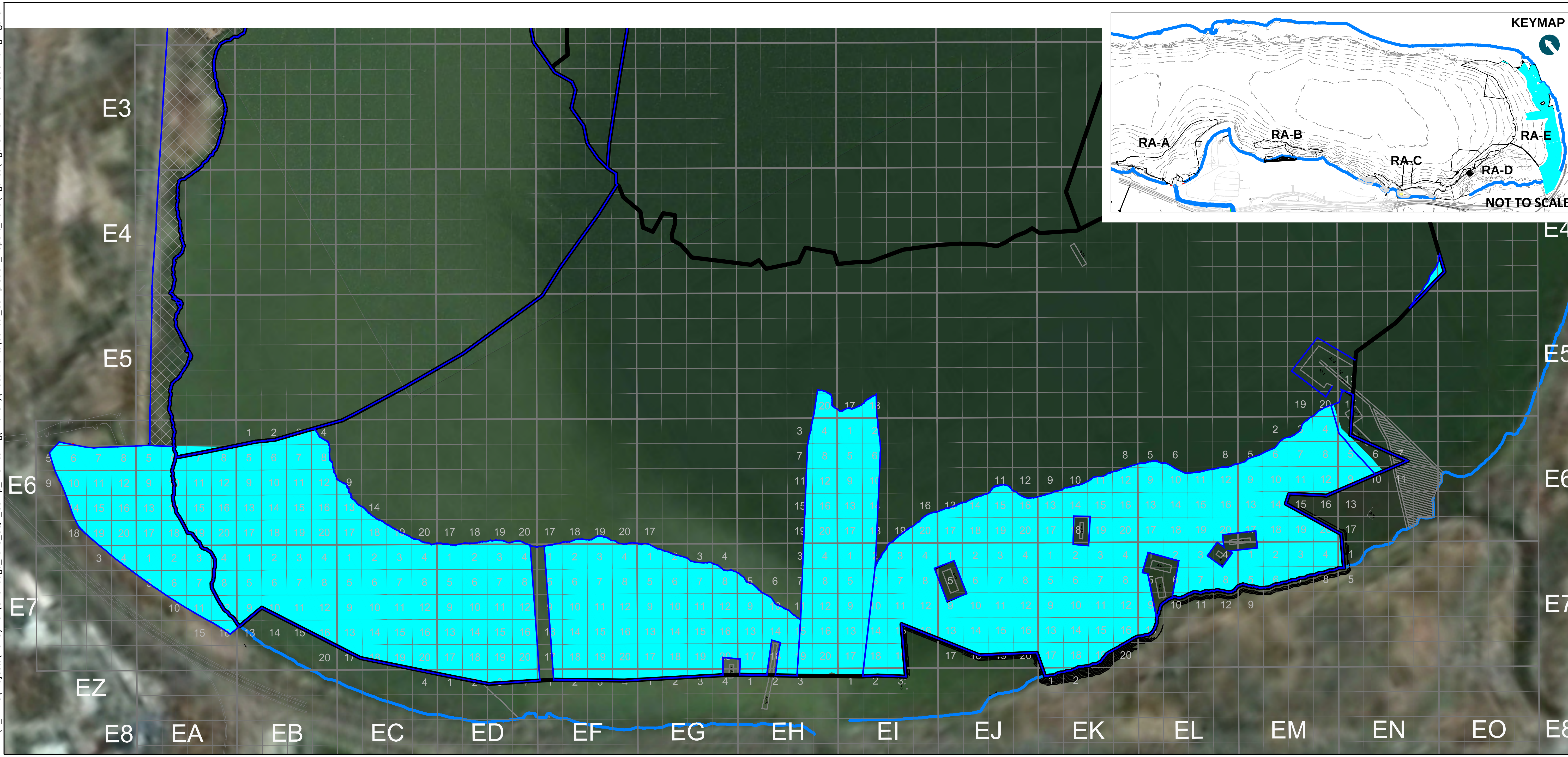
Figure 4-5
Completed DMUs - RA-D
Construction Completion Report
Onondaga Lake Capping and Dredging



SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

- Shoreline (elev. 362.5')
- Dredge Boundary
- EE / E2 / 10 — DMU Boundary
- Remediation Area Boundary
- Dredge Completed and Approved

0 400
Scale in Feet

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.6New-01013902.dwg Figure 4-6

Aug 20, 2017 9:02am cyard

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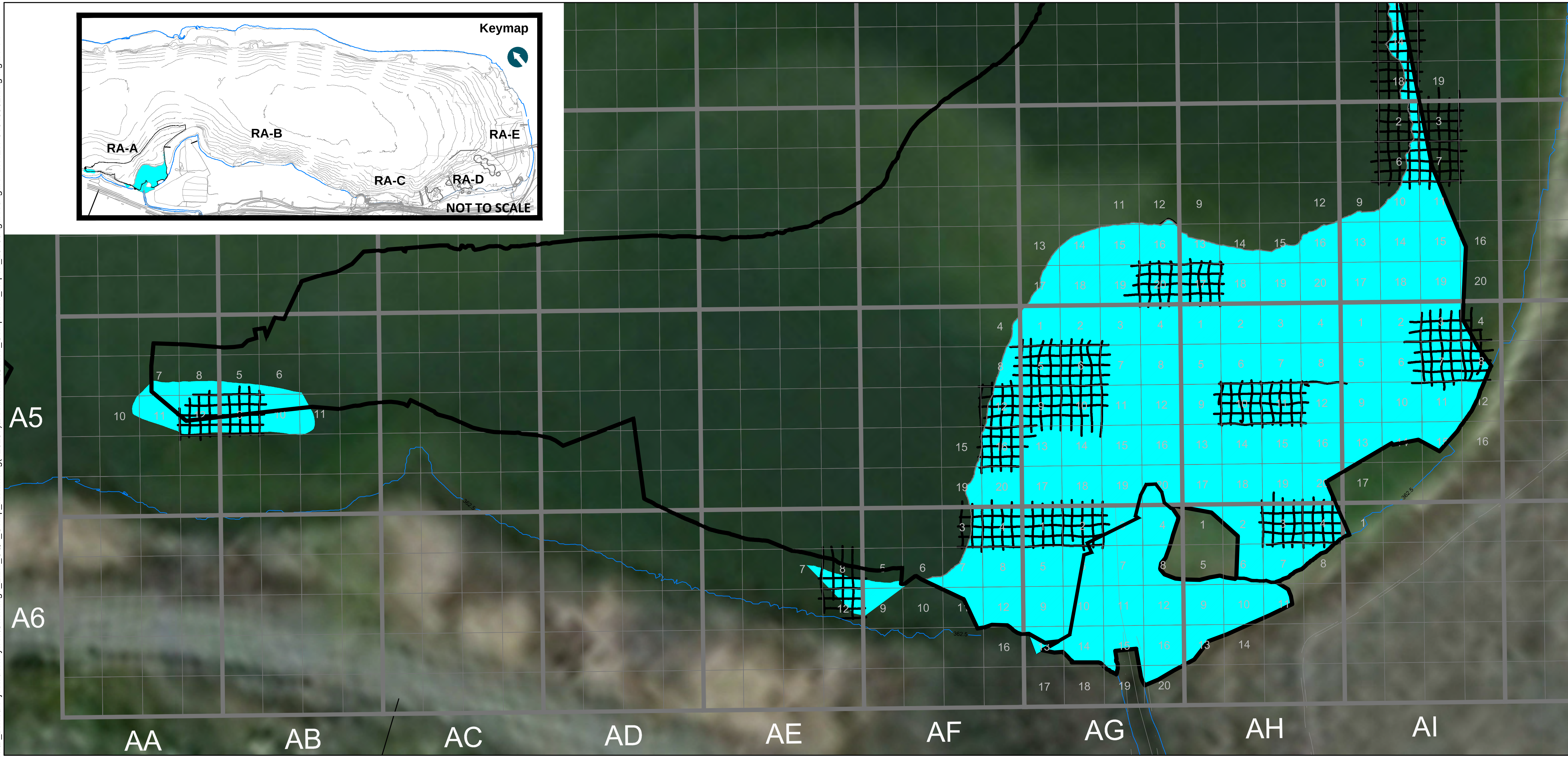
Figure 4-6
Completed DMUs - RA-E
Construction Completion Report
Onondaga Lake Capping and Dredging



SOURCE: Aerial Source: Bing Maps / Survey: Anchor QEA 2012
20140618-AB-AQ-AFGIA5, 20140620-AB-AQ-AGHA4AHA5A6,
20140624-AB-AQ-AABA5AEFGA6, 20140521-AB-AQ-AIA3A4
HORIZONTAL DATUM: New York State Plane, Central Zone,
North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:
- CQA Survey Track Lines
- Dredge Complete and Approved/ CQC Survey Area
- Remediation Area Boundary

0 250
Scale in Feet

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Aug 20, 2017 9:29am cyard

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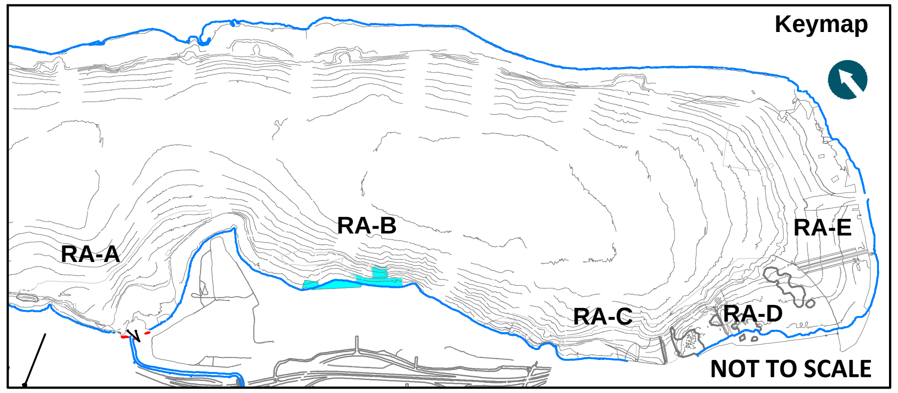
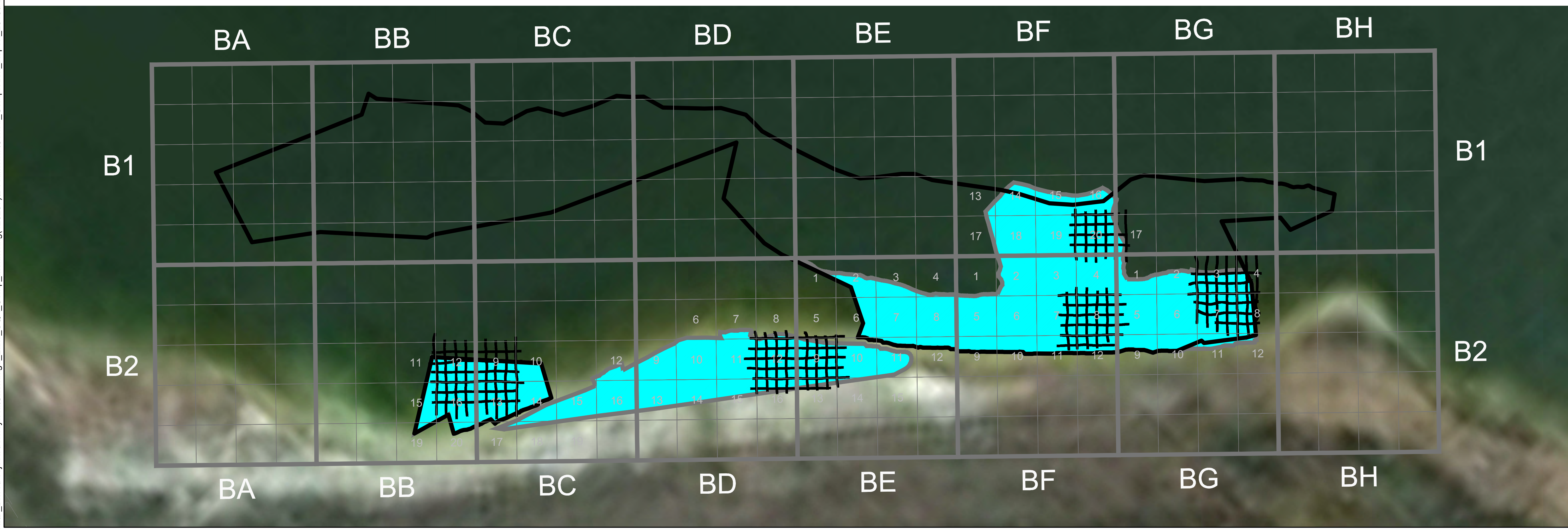
Figure 4-7
CQA Survey Coverage - RA-A
Construction Completion Report
Onondaga Lake Capping and Dredging

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.8NEW-01013902.dwg Figure 4-8





Aug 20, 2017 9:47am cyard

SOURCE: Aerial Source: Bing Maps / Survey: Anchor QEA 2012
20141028-AB-AQ-BBBCB2, 20141028-AB-AQ-BGB2, 20141029-AB-AQ-BFBGB1,
20141030-AB-AQ-BDBEB2, 20141030-AB-AQ-BFB2
HORIZONTAL DATUM: New York State Plane, Central Zone,
North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:
CQA Survey Track Lines
Dredge Complete and Approved/
CQC Survey Area
Remedial Area Boundary

0 250
Scale in Feet

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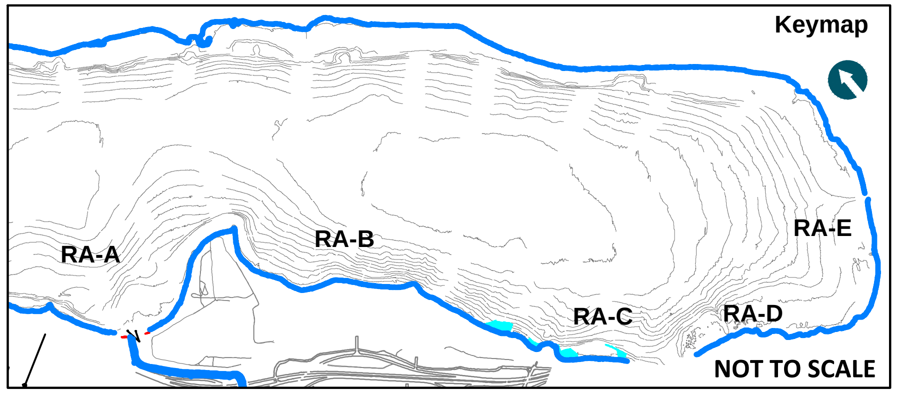
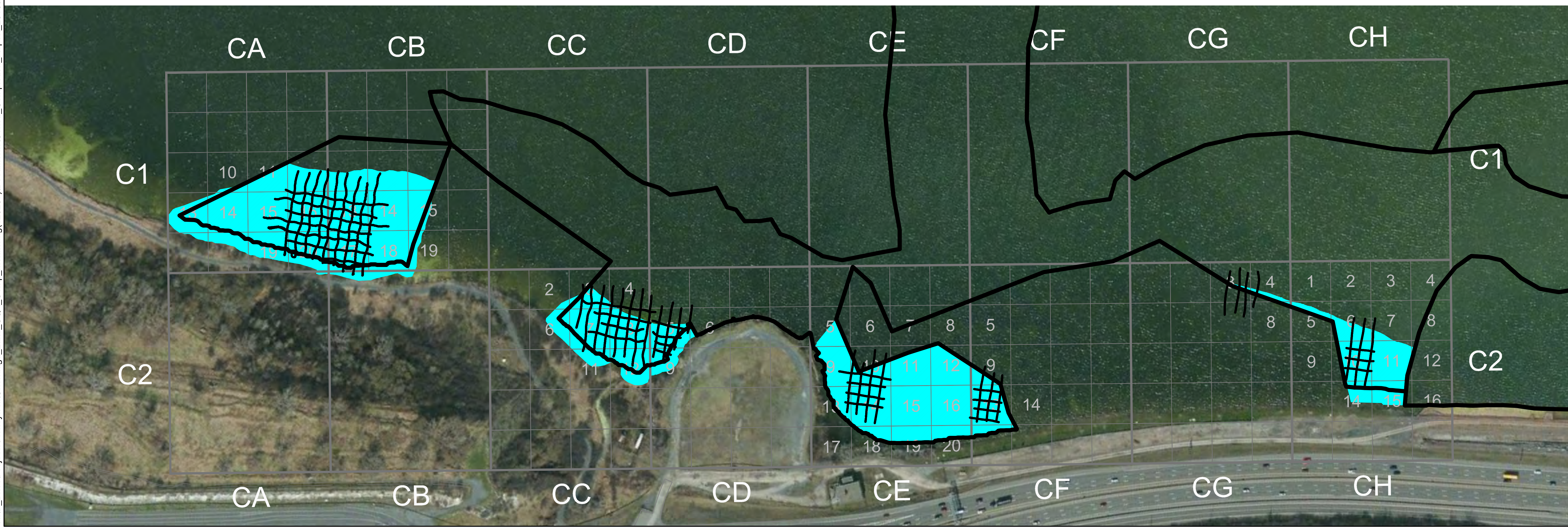
Figure 4-8
CQA Survey Coverage - RA-B
Construction Completion Report
Onondaga Lake Capping and Dredging

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.9\NEW-01013902.dwg Figure 4-9

Aug 20, 2017 10:05am cyard





SOURCE: Aerial Source: Bing Maps / Survey: Anchor QEA 2012
2012-08-21-AB-AQ-CE-C2, 2012-08-21-AB-AQ-CF-C2,
2012-08-21-AB-AQ-CG-C2, 2012-08-21-AB-AQ-CH-C2,
20141016-AB-AQ-CACBC1C2, 20141028-AB-AQ-CCC2, 20141029-AB-AQ-CDC2
HORIZONTAL DATUM: New York State Plane, Central Zone,
North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:
- CQA Survey Track Lines
- Dredge Complete and Approved/ CQC Survey Area
- Remediation Area Boundary

0 250
Scale in Feet

Honeywell

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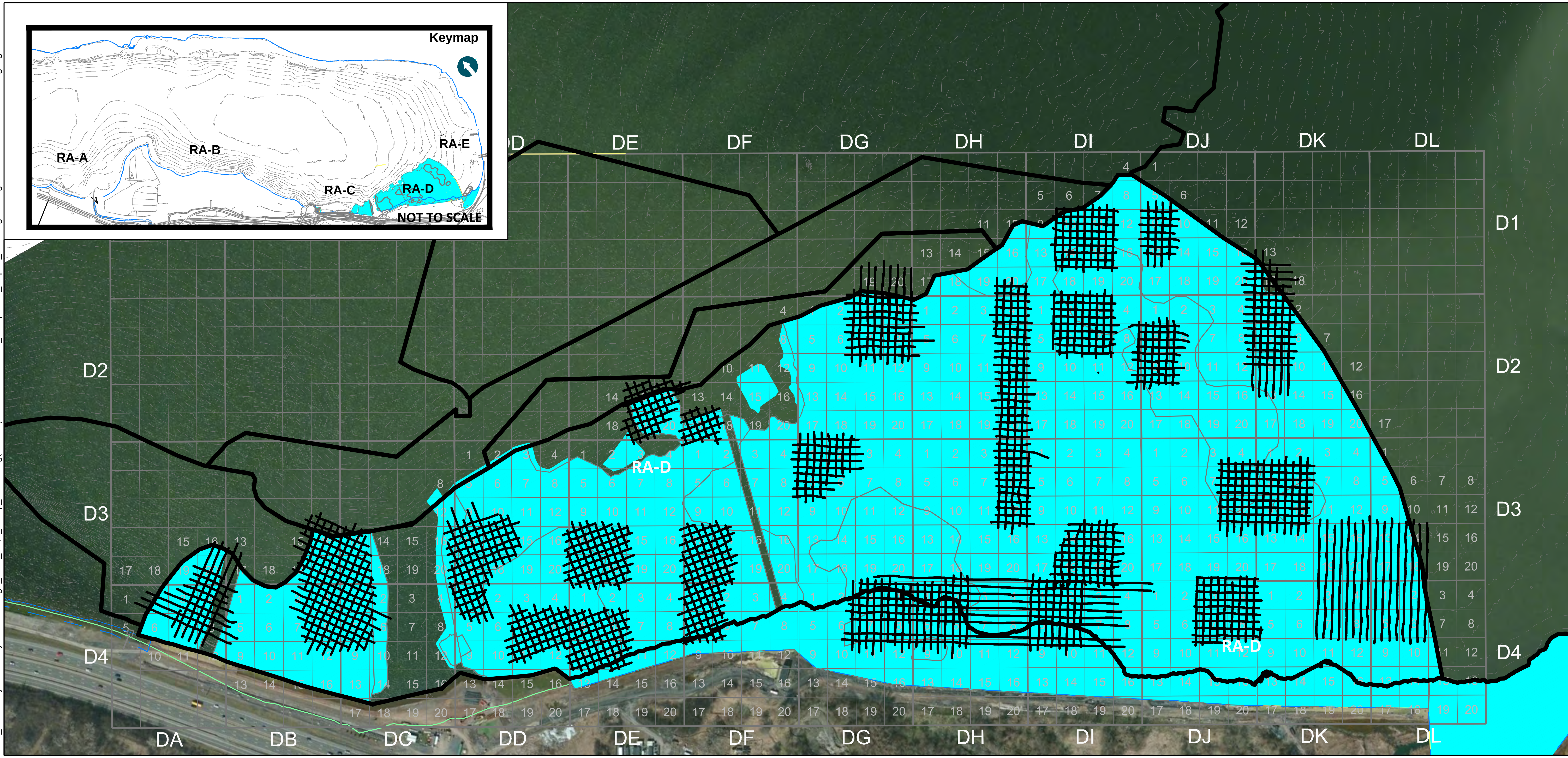
Figure 4-9
CQA Survey Coverage - RA-C
Construction Completion Report
Onondaga Lake Capping and Dredging

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.10\NEW-01013902.dwg Figure 4-10



Aug 20, 2017 11:57am cyard

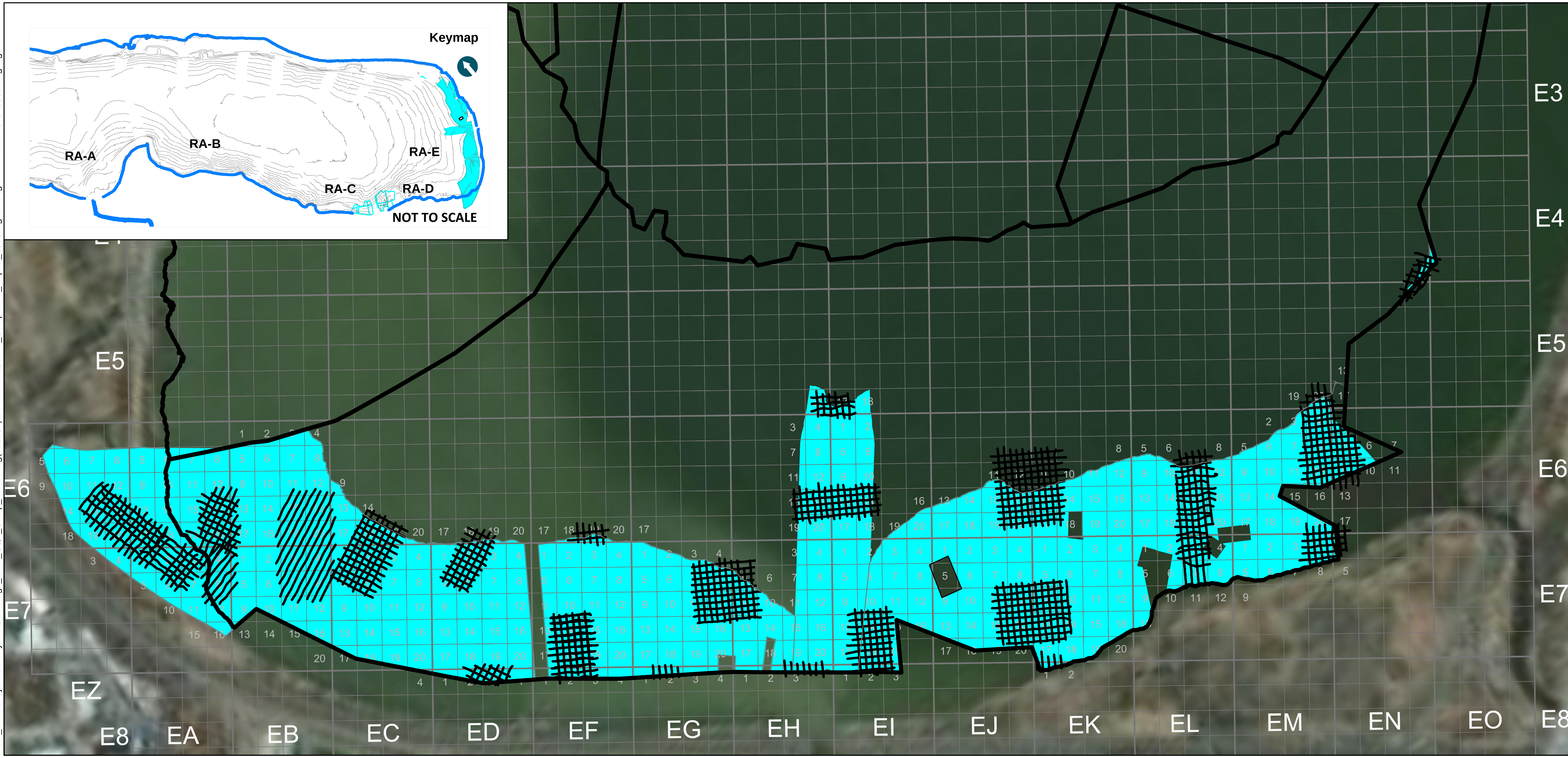
SOURCE: Aerial Source: Bing Maps / Survey: Anchor QEA 2012
20121121-DDD3D4-AQ-Survey, 20121115-DBD3D4-DCD3D4-AQ-Survey, 20121112-DAD3DAD4-AQ-Survey, 20131125-DKD12, 20131125-DJDKD3, 20131105-DJD2, 20131105-DJD1, 20131104-DID2, 20131104-DID1, 20131028-DID3, 20130930-RAD-DHD123, 20130821-DGD3, 20130821-DGD2, 20130821-DGD1, 20130812-DFD4, 20130812-DFD3, 20130812-DFD2, 20130731-DED4, 20130731-DED3, 20130731-DED2, 20130731-DDD4, 20140428-AB-AQ-DGDHDID4, 20140428-AB-AQ-DJD4, 20141008-AB-AQ-DKDLD3D4
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:
CQA Survey Track Lines
Dredge Complete and Approved/ CQC Survey Area
Remediation Area Boundary

0 350
Scale in Feet

ANCHOR QEA

Figure 4-10
CQA Survey Coverage - RA-D
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.11NEW-01013902.dwg Figure 4-11

Aug 20, 2017 12:06pm cyard

SOURCE: Aerial Source: Bing Maps / Survey: Anchor QEA 2012, 20140718-AB-AQ-EMENE5E6, 20140724-AB-AQ-ENEOE4E5, 20140804-AB-AQ-ELE6E7, 20140804-AB-AQ-EMENE7, 20140819-AB-AQ-EJEKE6, 20140903-AB-AQ-EFE7E8-REV, 20140903-AB-AQ-EHEIE5-REV, 20140903-AB-AQ-EJEKE7-REV, 20140908-AB-AQ-ECE6E7, 20140908-AB-AQ-EHEIE6, 20140917-AB-AQ-EGEHE7, 20140917-AB-AQ-EGEHE7, 20140917-AB-AQ-EKE8, 20140924-AB-AQ-EDE6E7, 20140924-AB-AQ-EDE8, 20140924-AB-AQ-EFE6, 20140924-AB-AQ-EFE7, 20140924-AB-AQ-EGE8, 20140924-AB-AQ-EHE8, 20141002-AB-AQ-EBE6E7, 20141008-AB-AQ-EAE6, 20141008-AB-AQ-EAE7, 20141016-AB-AQ-EAEZOBE6E7,
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

- CQA Survey Track Lines
- Dredge Complete and Approved/ CQC Survey Area
- Remediation Area Boundary

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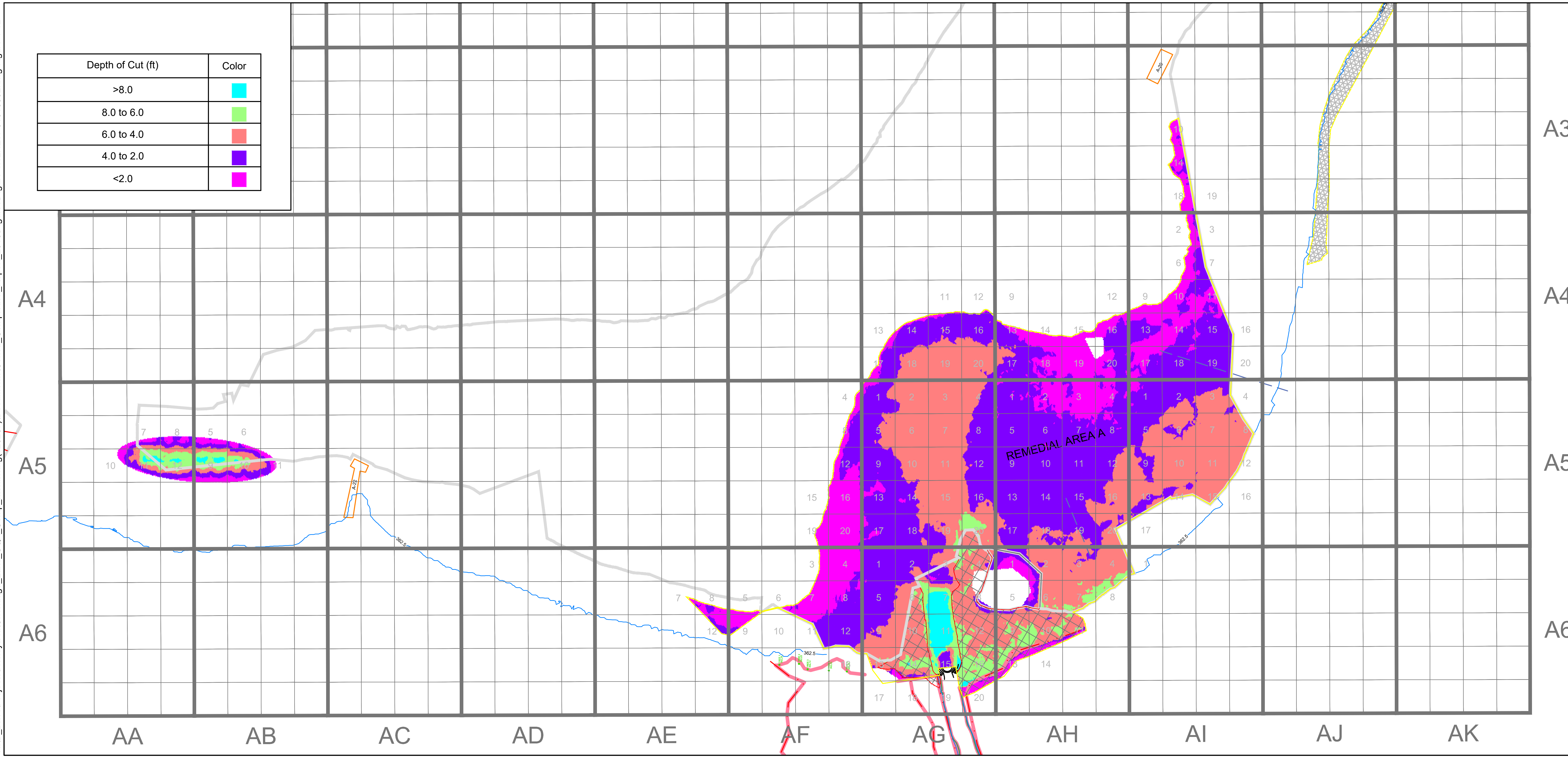
Figure 4-11
CQA Survey Coverage - RA-E
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_COA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.12NEW-01013902.dwg Figure 4-12

Aug 20, 2017 12:09pm cyard

SOURCE: RAA Pro_061914 / EXG-Lake
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

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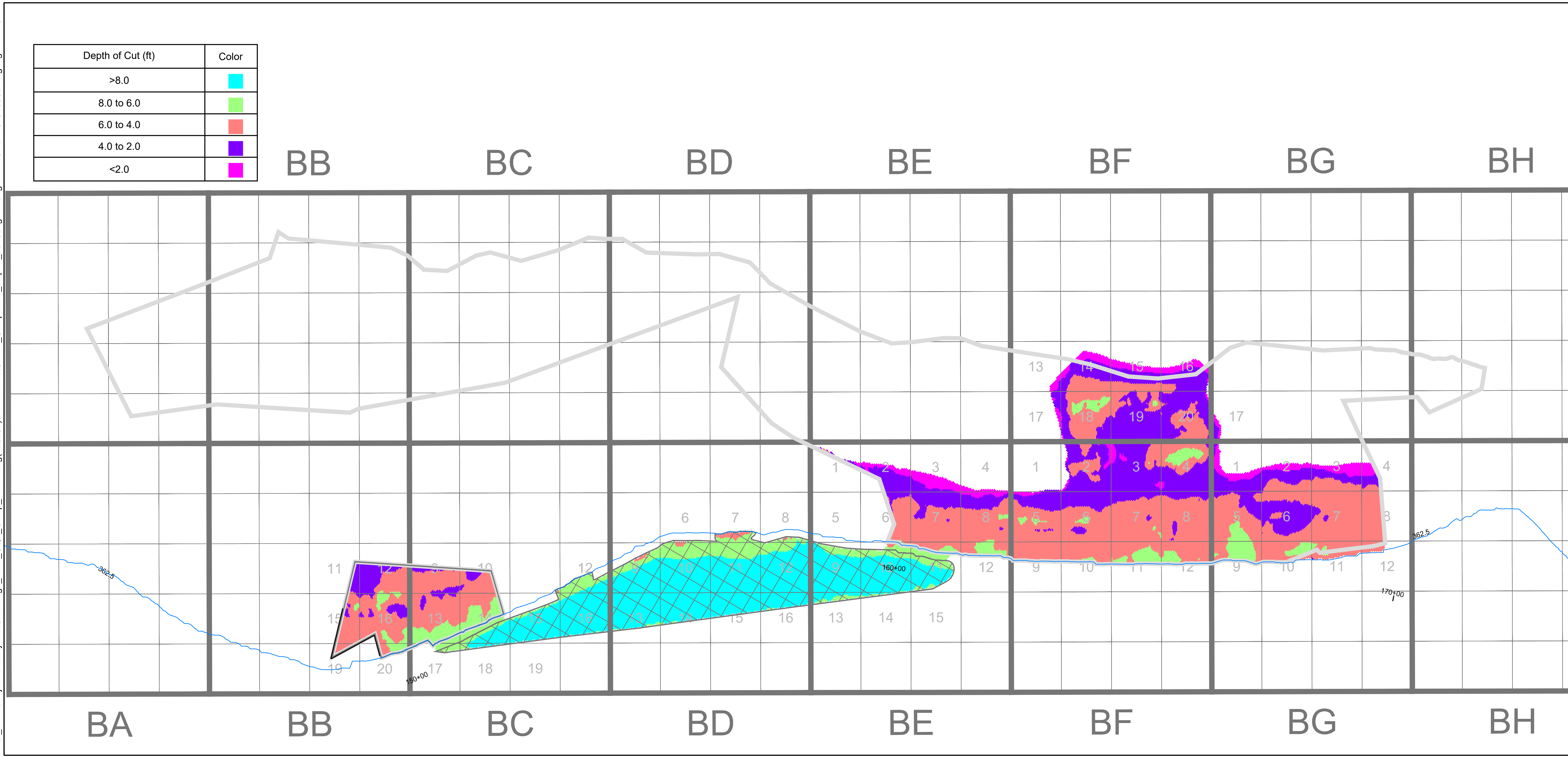
Figure 4-12
Dredge Removal Thickness - RA-A
Construction Completion Report
Onondaga Lake Capping and Dredging



SOURCE: RAB Pro_102914 / EXG-Lake
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

0 200
Scale in Feet

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_COA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.13NEW-01013902.dwg Figure 4-13

Aug 20, 2017 12:10pm cyard

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Figure 4-13
Dredge Removal Thickness - RA-B
Construction Completion Report
Onondaga Lake Capping and Dredging

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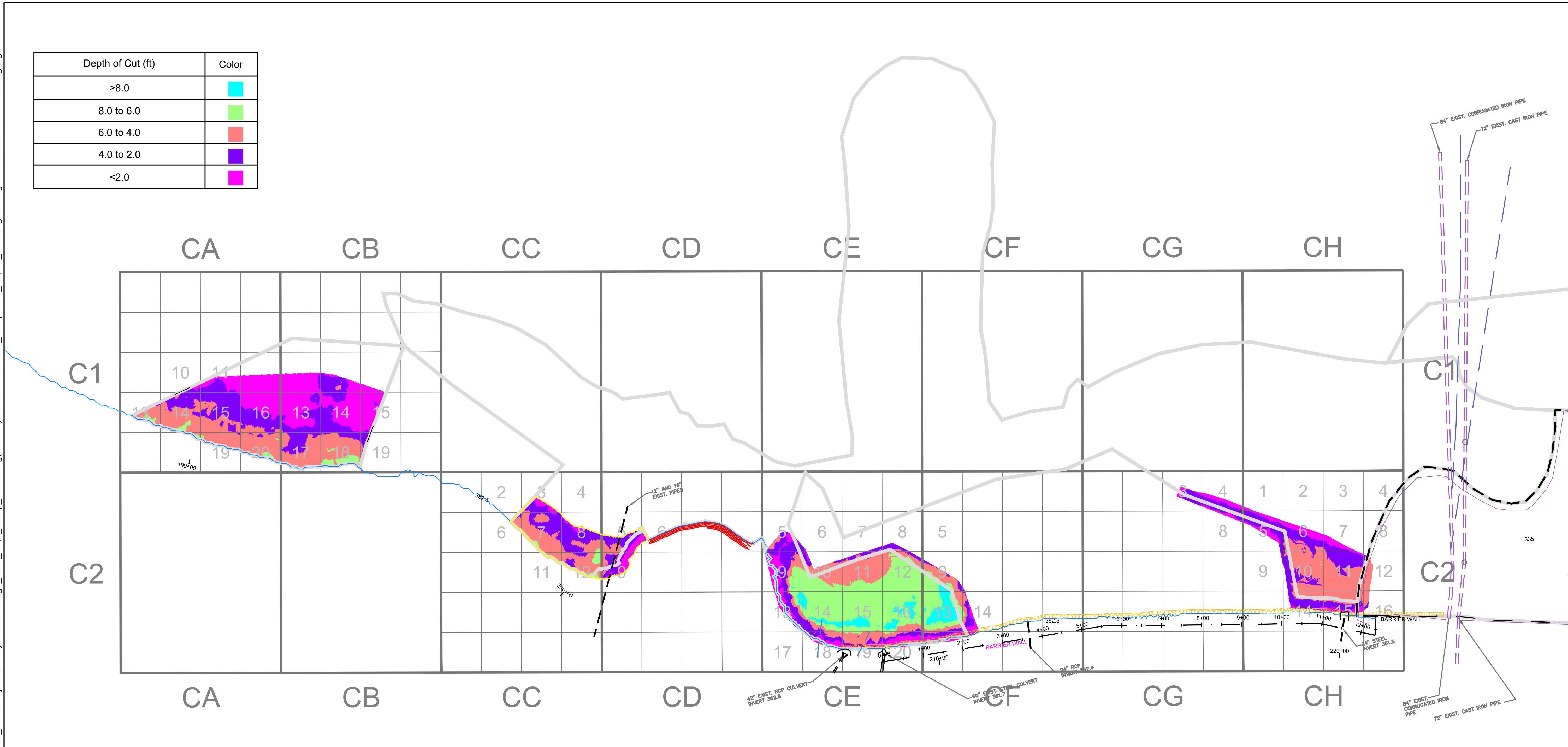

Depth of Cut (ft)	Color
>8.0	
8.0 to 6.0	
6.0 to 4.0	
4.0 to 2.0	
<2.0	

SOURCE: RAC Pro_101114, 2012-10-25-Csurface-SES / EXG-Lake
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

Aug 20, 2017 12:12pm cyard

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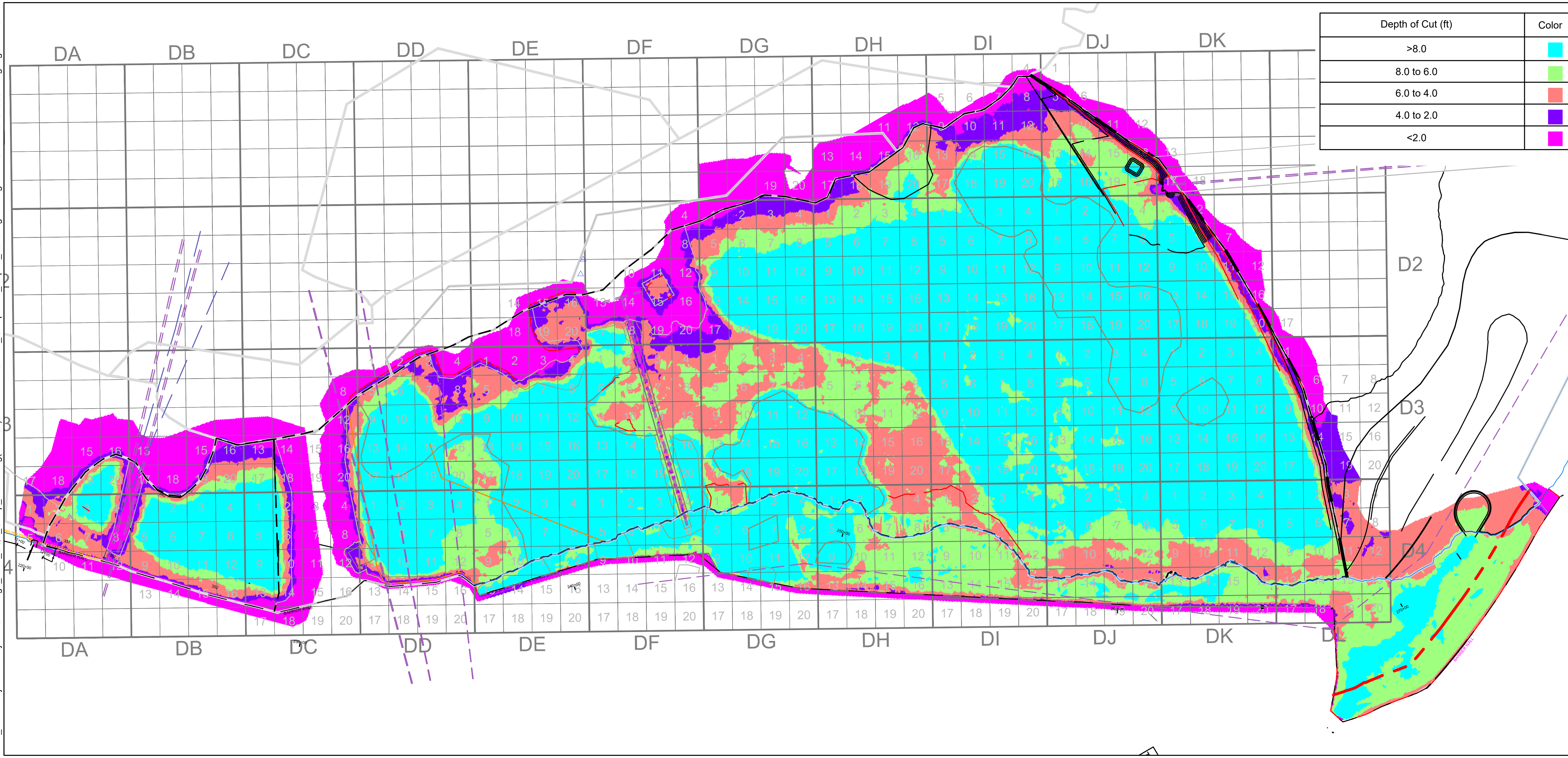
Figure 4-14
Dredge Removal Thickness - RA-C
Construction Completion Report
Onondaga Lake Capping and Dredging



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Aug 20, 2017 12:20pm cyard

SOURCE: RAD Pro_101514_B /RAD East Pro_West Clip_091613/
RAD Bowl Pro_041714 / EG-Overall
HORIZONTAL DATUM: New York State Plane, Central Zone,
North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

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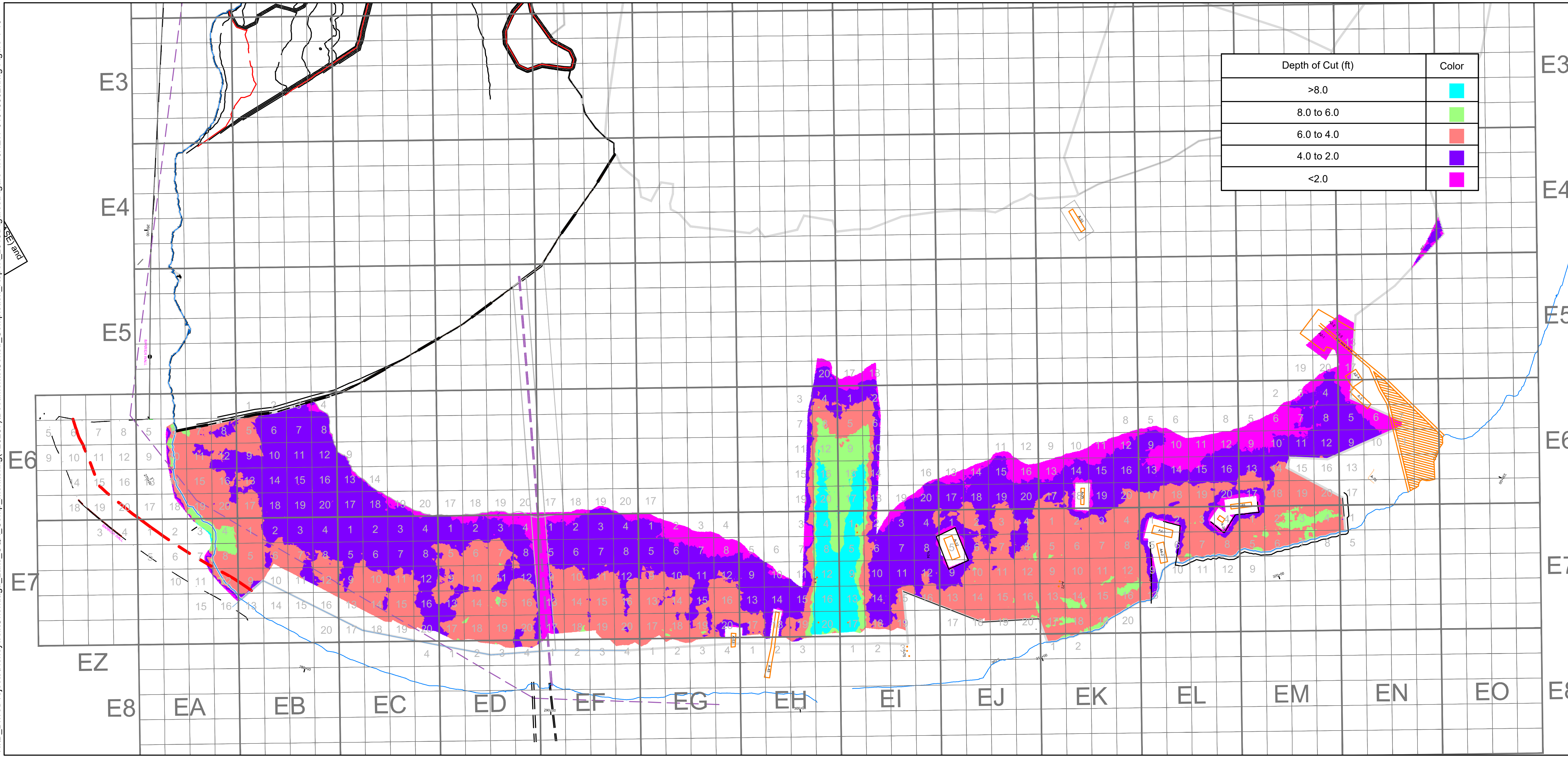
Figure 4-15
Dredge Removal Thickness - RA-D
Construction Completion Report
Onondaga Lake Capping and Dredging



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Aug 20, 2017 12:22pm cyard

SOURCE: RAE Pro_100714 / EXG-Lake
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

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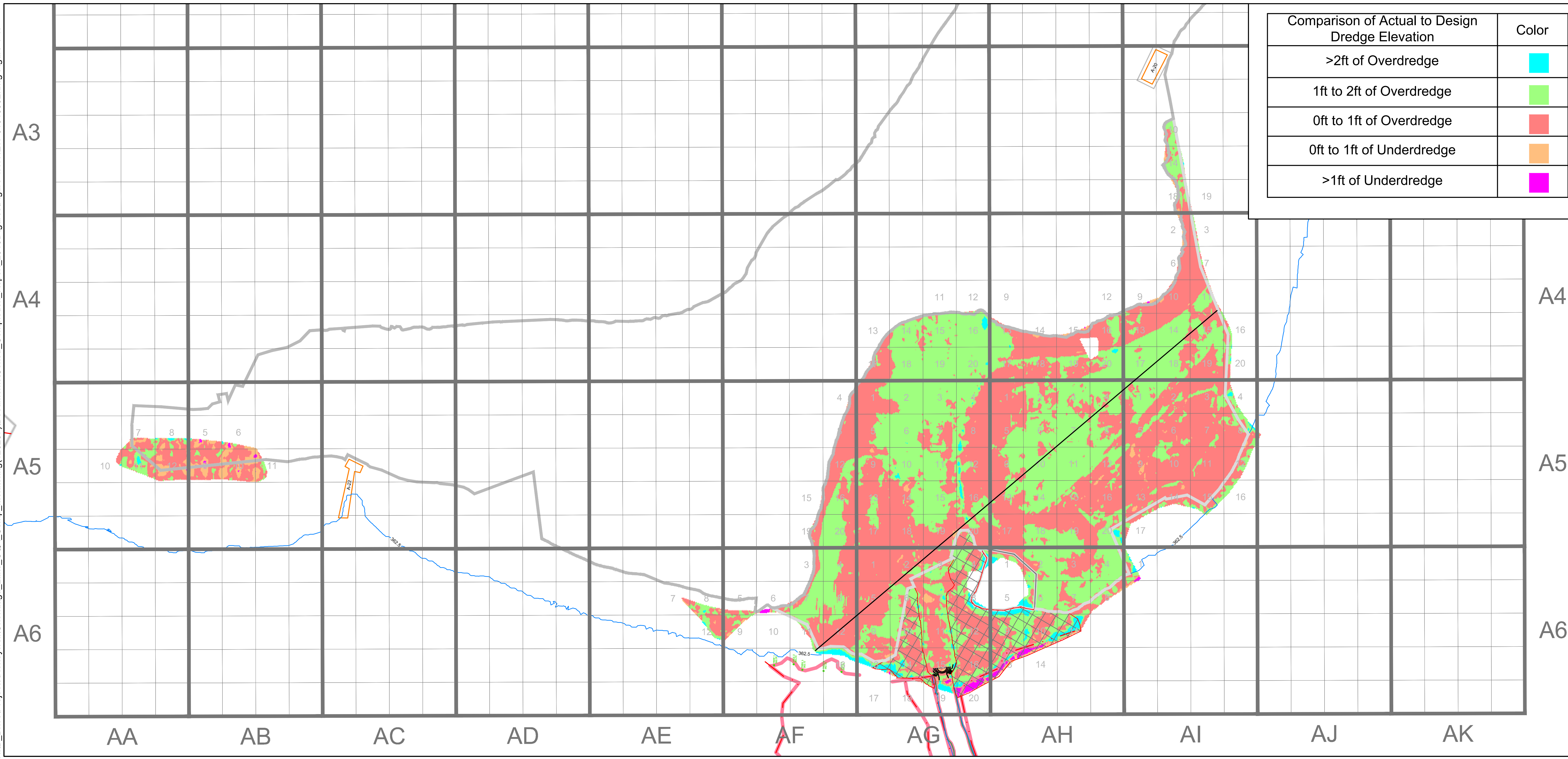
Figure 4-16
Dredge Removal Thickness - RA-E
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.17NEW-01013902.dwg Figure 4-17

Aug 29, 2017 1:28pm cyard

SOURCE: RA-C-3-Post Dredge / RA-C-4-Post Dredge / 2012-10-25-CSURFACE-SES
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

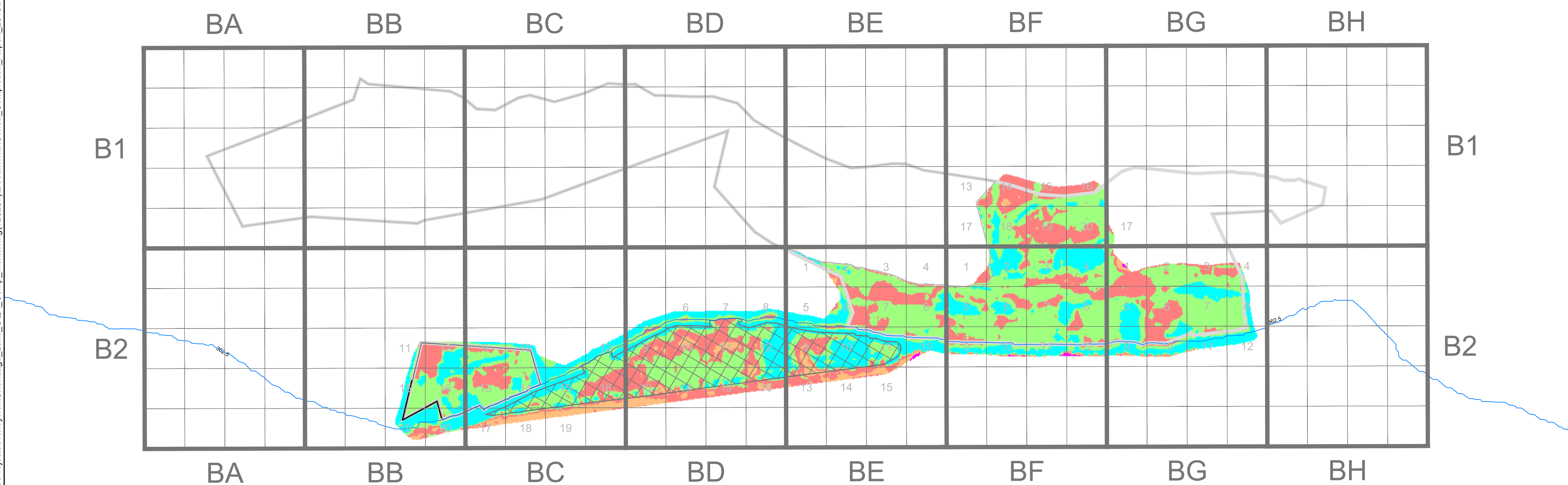
0 300
Scale in Feet

Honeywell

ANCHOR QEA

Figure 4-17
Dredge Comparison to Design Elevations - RA-A
Construction Completion Report
Onondaga Lake Capping and Dredging

Comparison of Actual to Design Dredge Elevation	Color
>2ft of Overdredge	
1ft to 2ft of Overdredge	
0ft to 1ft of Overdredge	
0ft to 1ft of Underdredge	
>1ft of Underdredge	



SOURCE: RA-C-3-Post Dredge / RA-C-4-Post Dredge / 2012-10-25-CSURFACE-SES
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

0 250
Scale in Feet

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.18NEW-01013902.dwg Figure 4-18

Aug 29, 2017 1:35pm cyard

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Figure 4-18
Dredge Comparison to Design Elevations - RA-B
Construction Completion Report
Onondaga Lake Capping and Dredging

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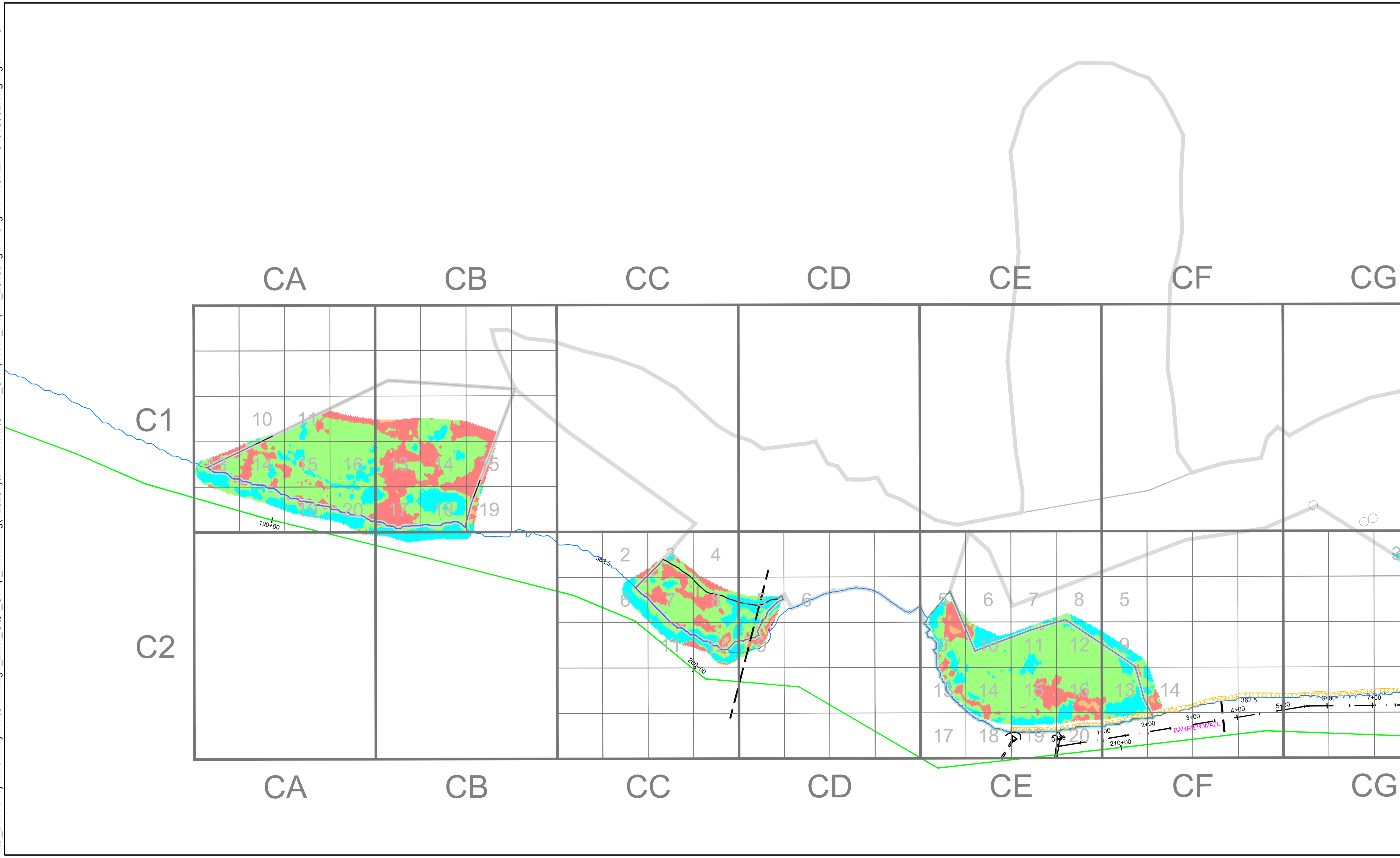

Comparison of Actual to Design Dredge Elevation	Color
>2ft of Overdredge	
1ft to 2ft of Overdredge	
0ft to 1ft of Overdredge	
0ft to 1ft of Underdredge	
>1ft of Underdredge	

SOURCE: RA-C_DP_XYZ EXPORT / RA-C-4-Post Dredge / RAC Pro_101114 / 2012-10-25-CSURFACE-SES
HORIZONTAL DATUM: New York State Plane, Central Zone,
North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

Aug 29, 2017 1:37pm cyard

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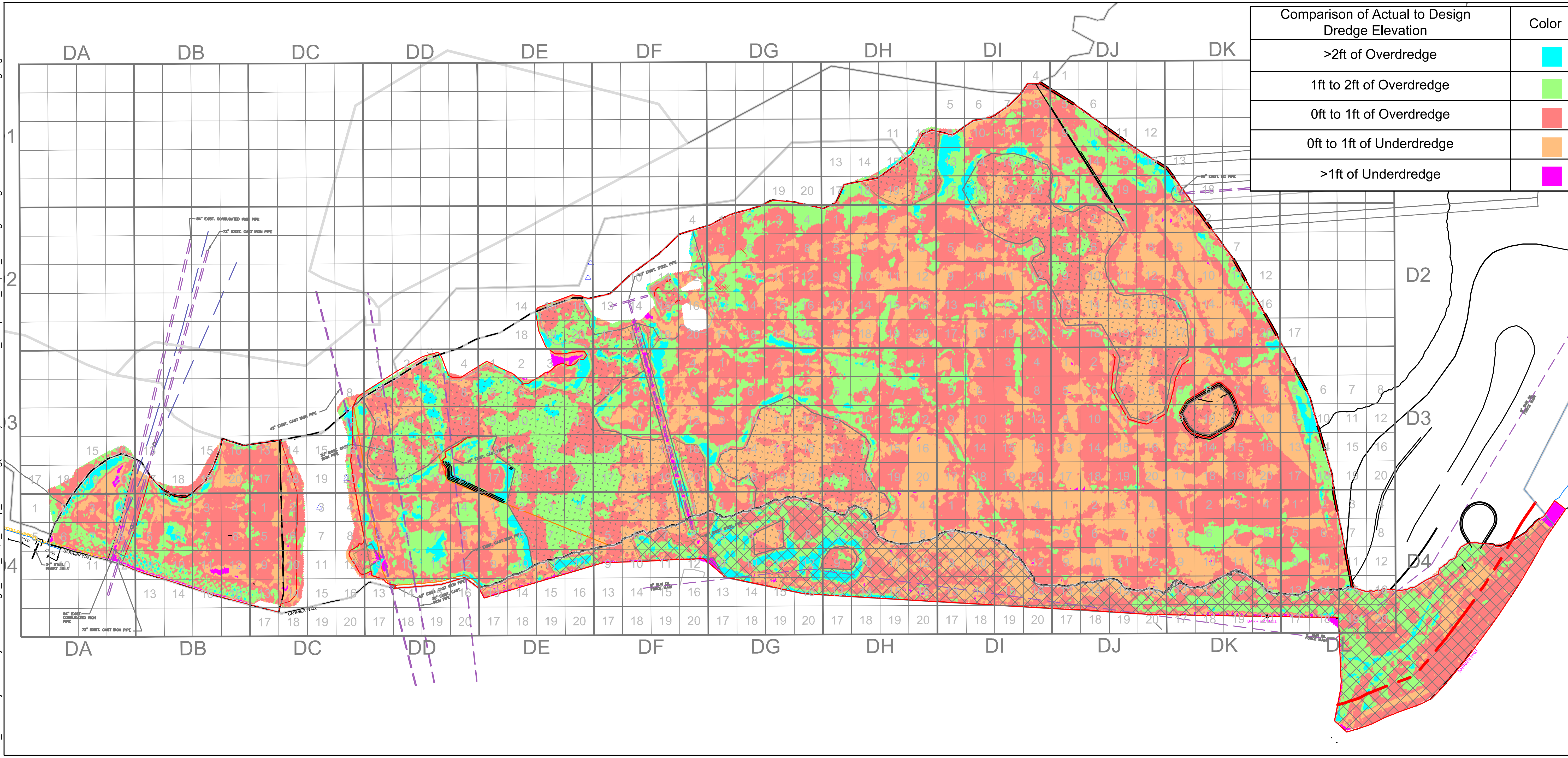
Figure 4-19
Dredge Comparison to Design Elevations - RA-C
Construction Completion Report
Onondaga Lake Capping and Dredging



Comparison of Actual to Design Dredge Elevation	Color
>2ft of Overdredge	
1ft to 2ft of Overdredge	
0ft to 1ft of Overdredge	
0ft to 1ft of Underdredge	
>1ft of Underdredge	

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.20NEW-01013902.dwg Figure 4-20

Aug 29, 2017 1:39pm cyard

SOURCE: RA-D SMU 1, RAD East Design Combo_101013 vs. 2012-11-20-ESURFACE-SES / RAD East Pro_West Clip_091613 / RAD East Pro_112213
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

NOTE: The dredging goal within the in-lake waste deposit (ILWD, RA-D) was to achieve the specified dredge elevation with an average tolerance of plus or minus 0.5 foot, and no areas larger than 100 square feet with an underdredge greater than 1 foot.

0 350
Scale in Feet

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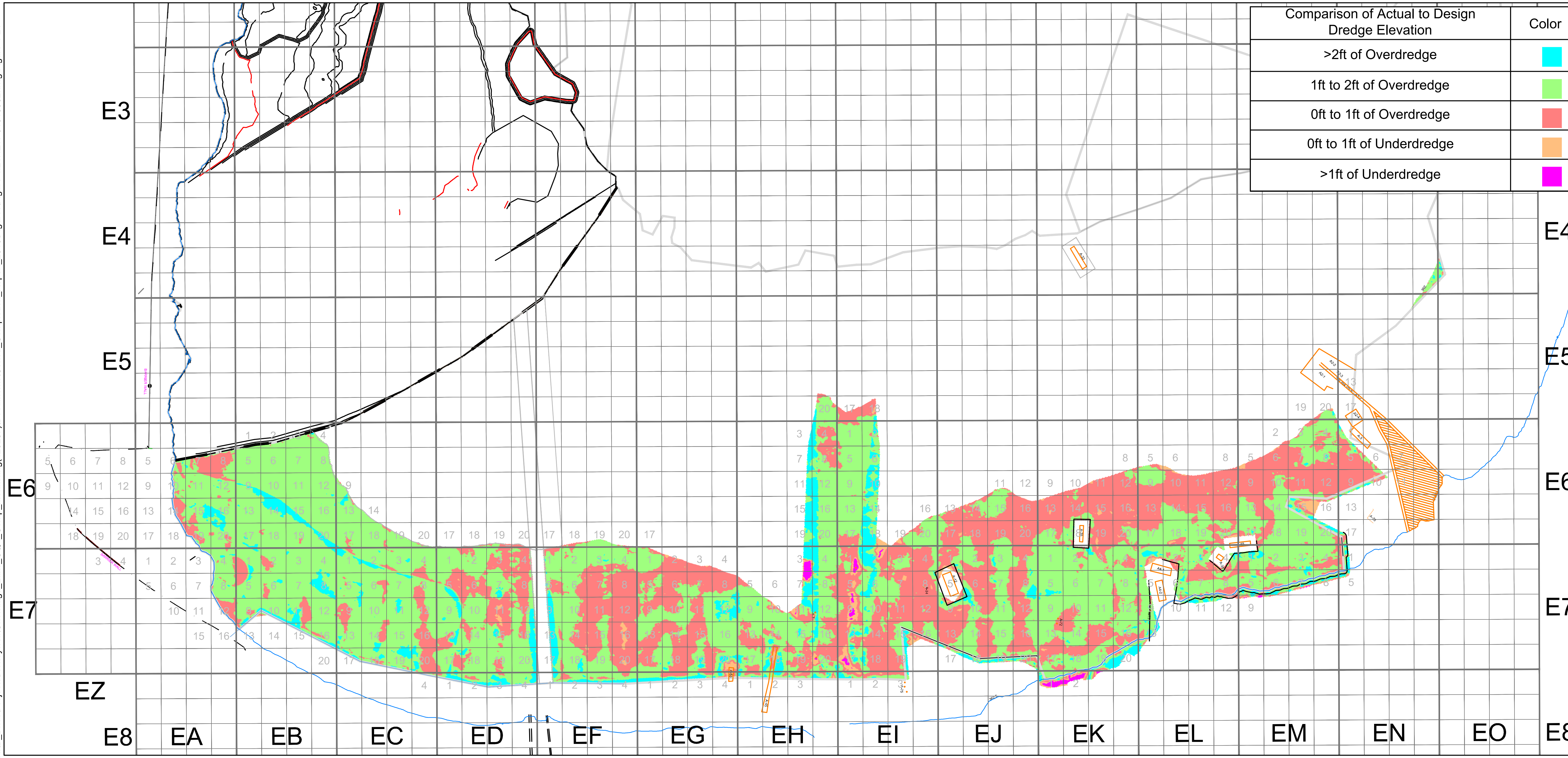
Figure 4-20
Dredge Comparison to Design Elevations - RA-D
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 4.21NEW-01013902.dwg Figure 4-21

Aug 29, 2017 1:42pm cyard

SOURCE: RA-E_North_South_DP_XYZ-EXPORT (20140626), RAE Pro_100714
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

0 400
Scale in Feet

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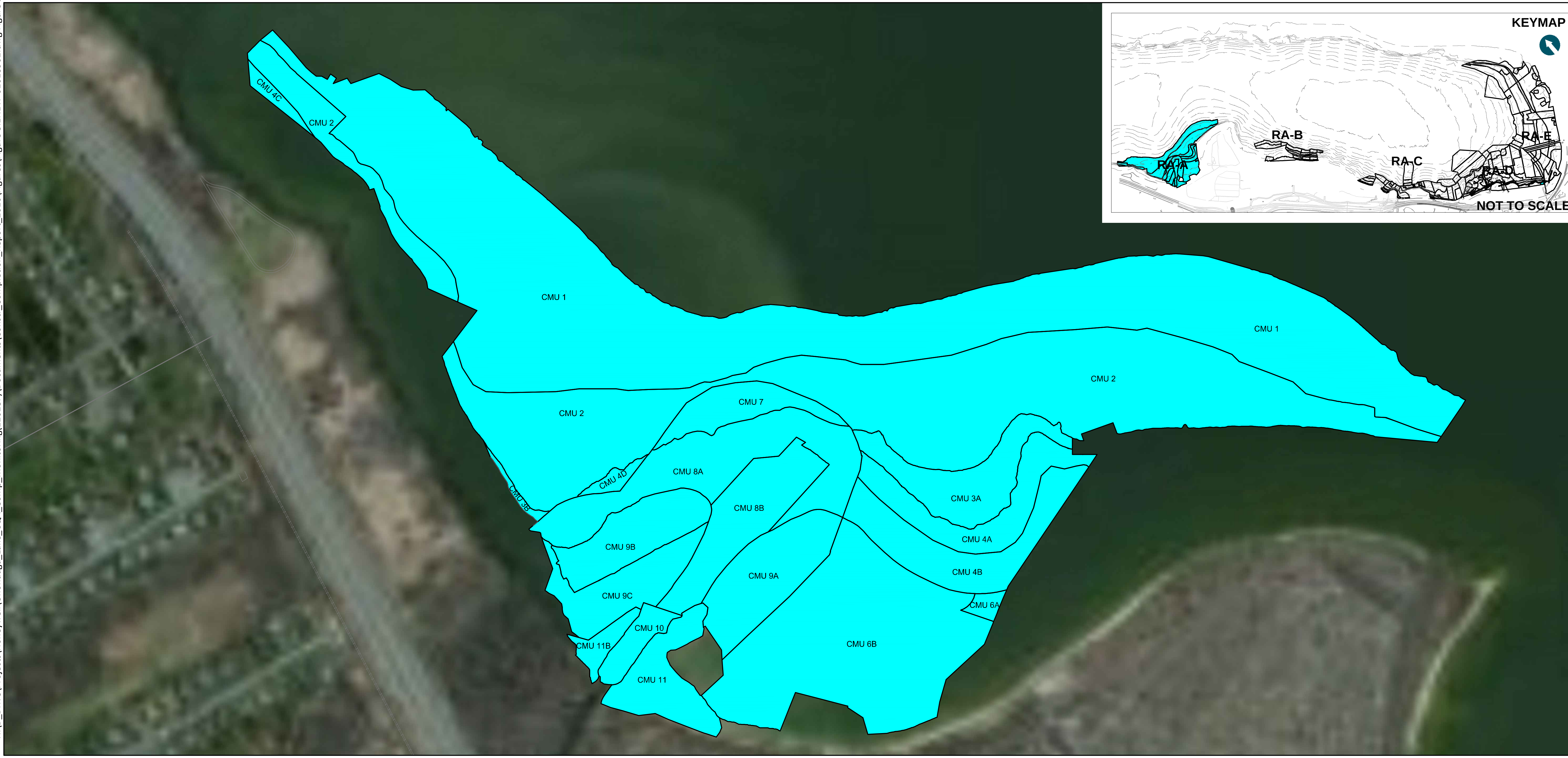
Figure 4-21
Dredge Comparison to Design Elevations - RA-E
Construction Completion Report
Onondaga Lake Capping and Dredging

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 5.1NEW-01013902.dwg Figure 5-1



SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

Shoreline (elev. 362.5')

CMU 10 — CMU Boundary

Ninemile Creek Spits

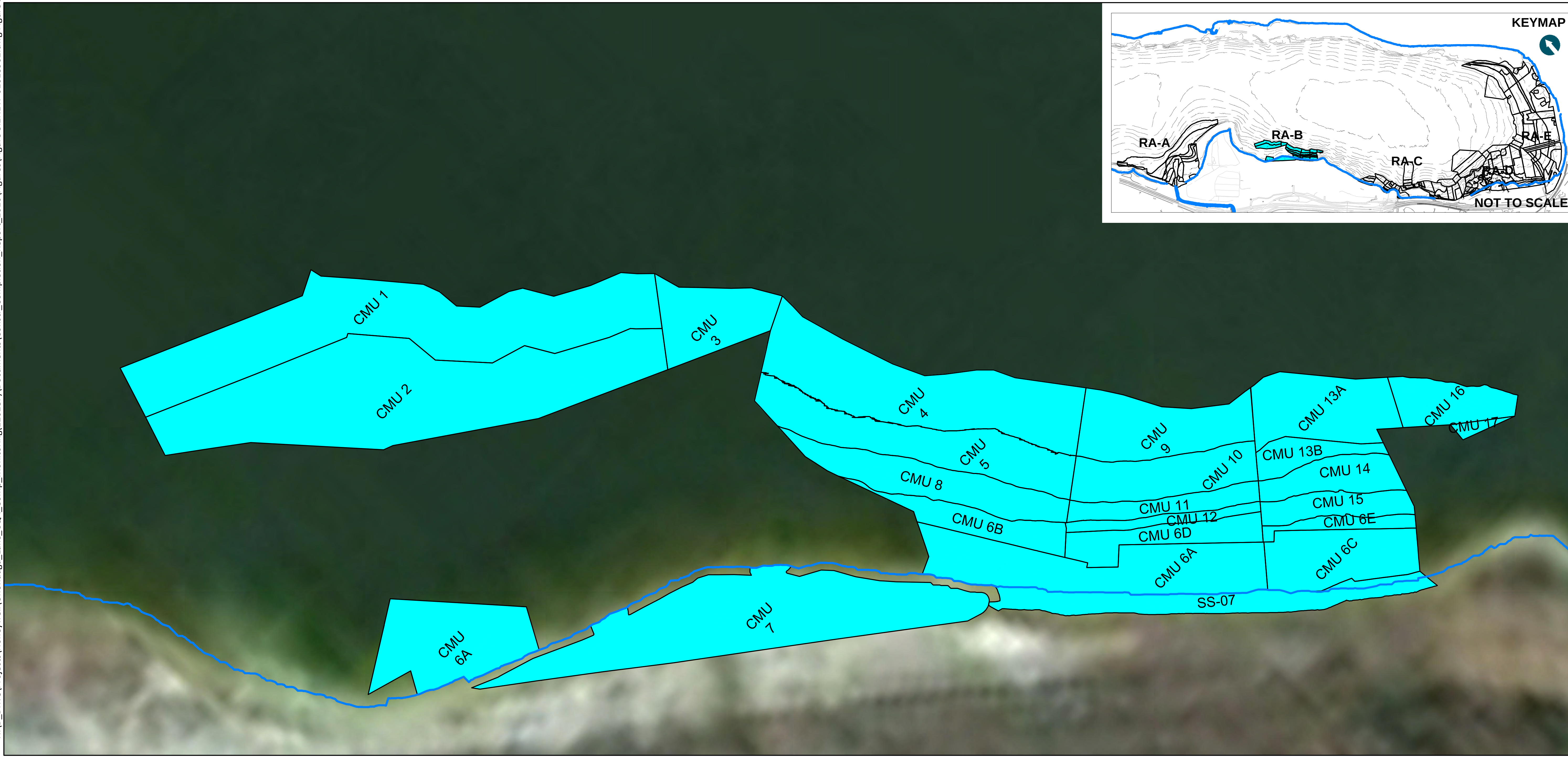
Cap Completed and Approved

0 350
Scale in Feet

Aug 20, 2017 12:45pm cyard

Figure 5-1
Completed CMUs - RA-A
Construction Completion Report
Onondaga Lake Capping and Dredging

Honeywell ANCHOR QEA



SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

Shoreline (elev. 362.5')

CMU 10 — CMU Boundary

Cap Completed and Approved

0 200
Scale in Feet

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_COA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 5.2NEW-01013902.dwg Figure 5-2

Aug 20, 2017 12:48pm cyard

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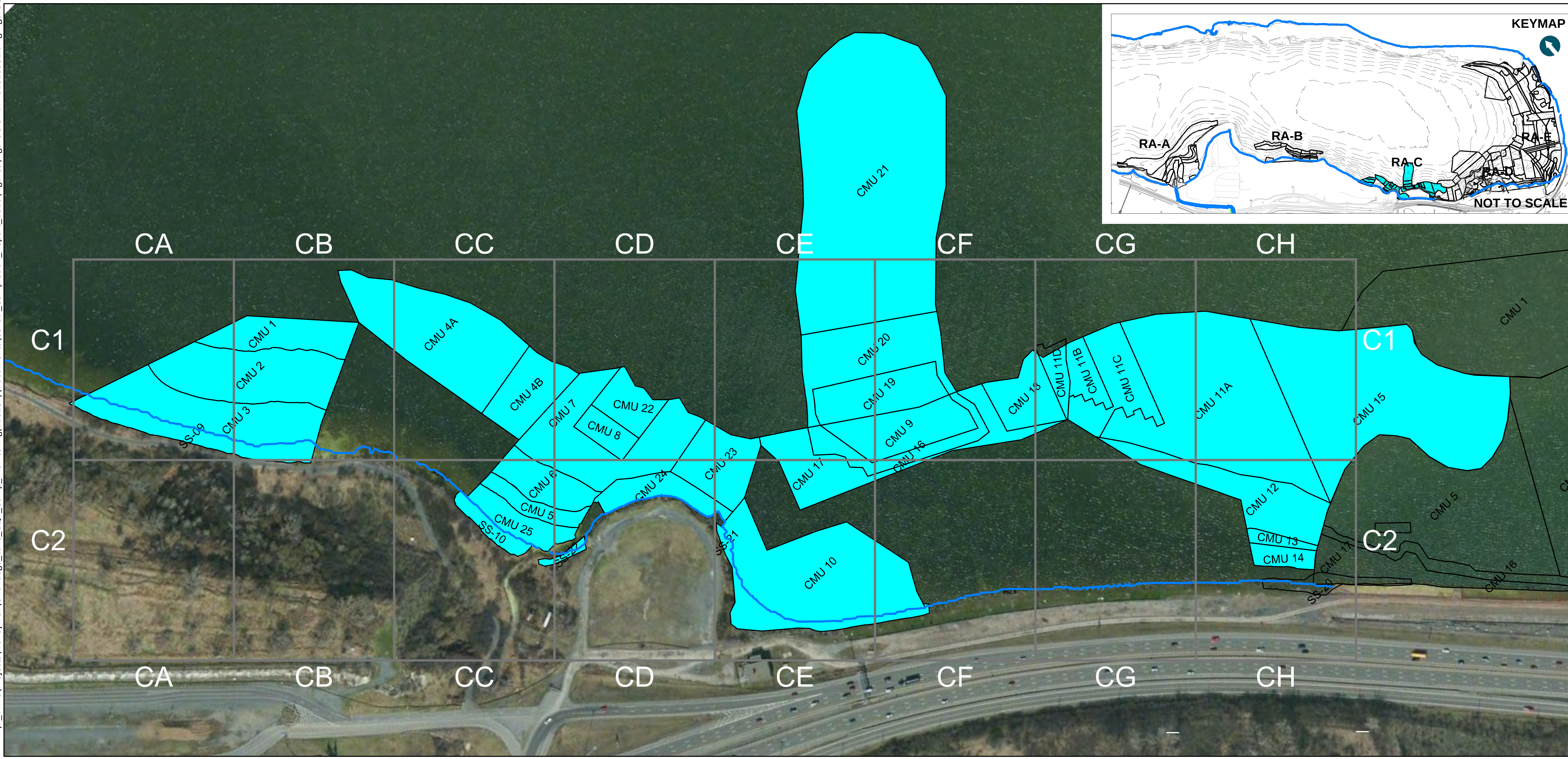
Figure 5-2
Completed CMUs - RA-B
Construction Completion Report
Onondaga Lake Capping and Dredging



SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

- Shoreline (elev. 362.5')
- CMU 10 — CMU Boundary
- Cap Completed and Approved

0 250
Scale in Feet

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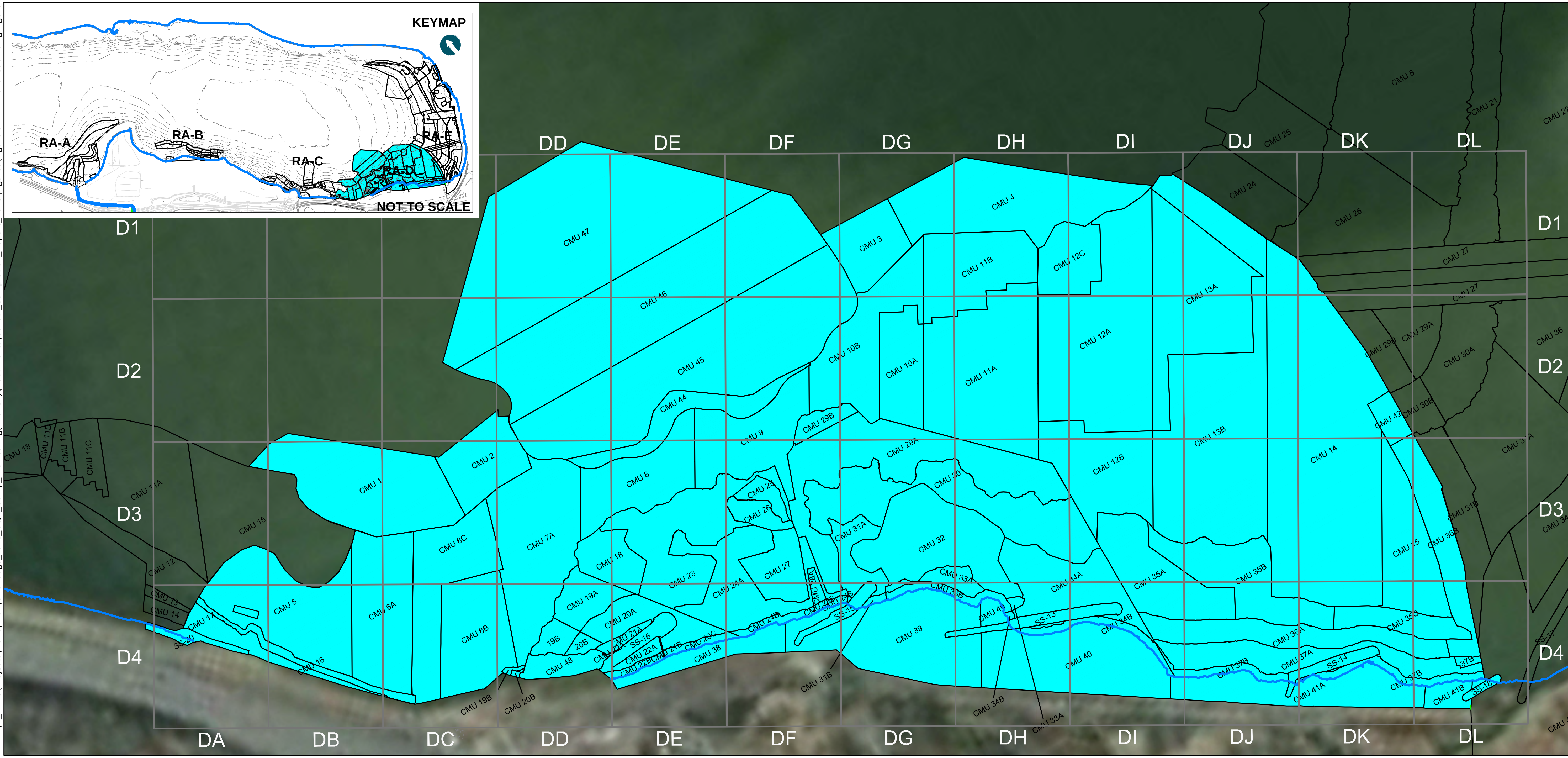
Figure 5-3
Completed CMUs - RA-C
Construction Completion Report
Onondaga Lake Capping and Dredging

H:\D_Drive\Projects\Honeywell\Onondaga_Lake_COA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 5.4NEW-01013902.dwg Figure 5-4



SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

Aug 20, 2017 12:53pm cyard

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Figure 5-4
Completed CMUs - RA-D
Construction Completion Report
Onondaga Lake Capping and Dredging

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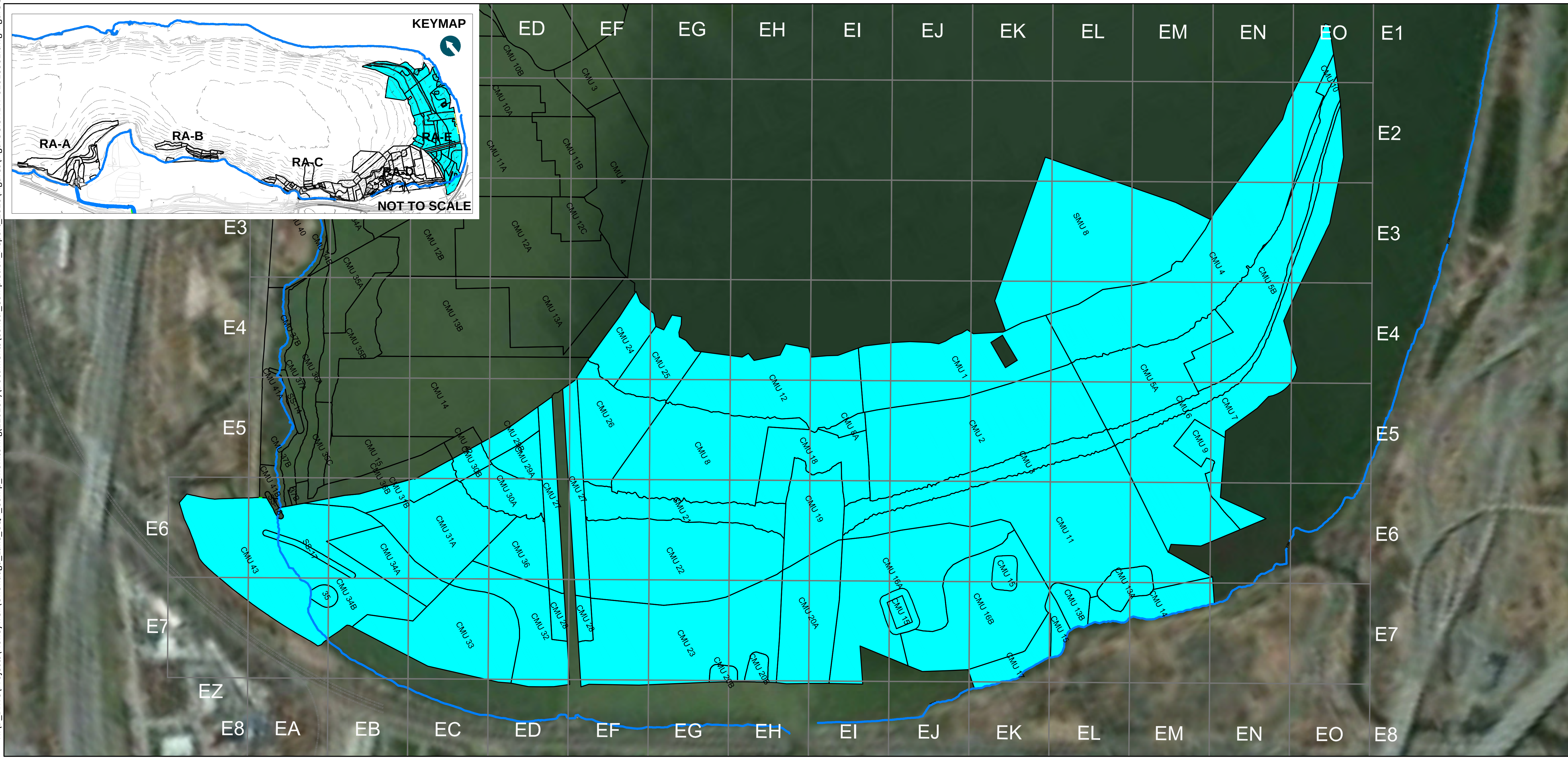

Aug 20, 2017 12:57pm cyard

SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:

Shoreline (elev. 362.5')

CMU 10 — CMU Boundary

Cap Completed and Approved

0 500
Scale in Feet

Honeywell

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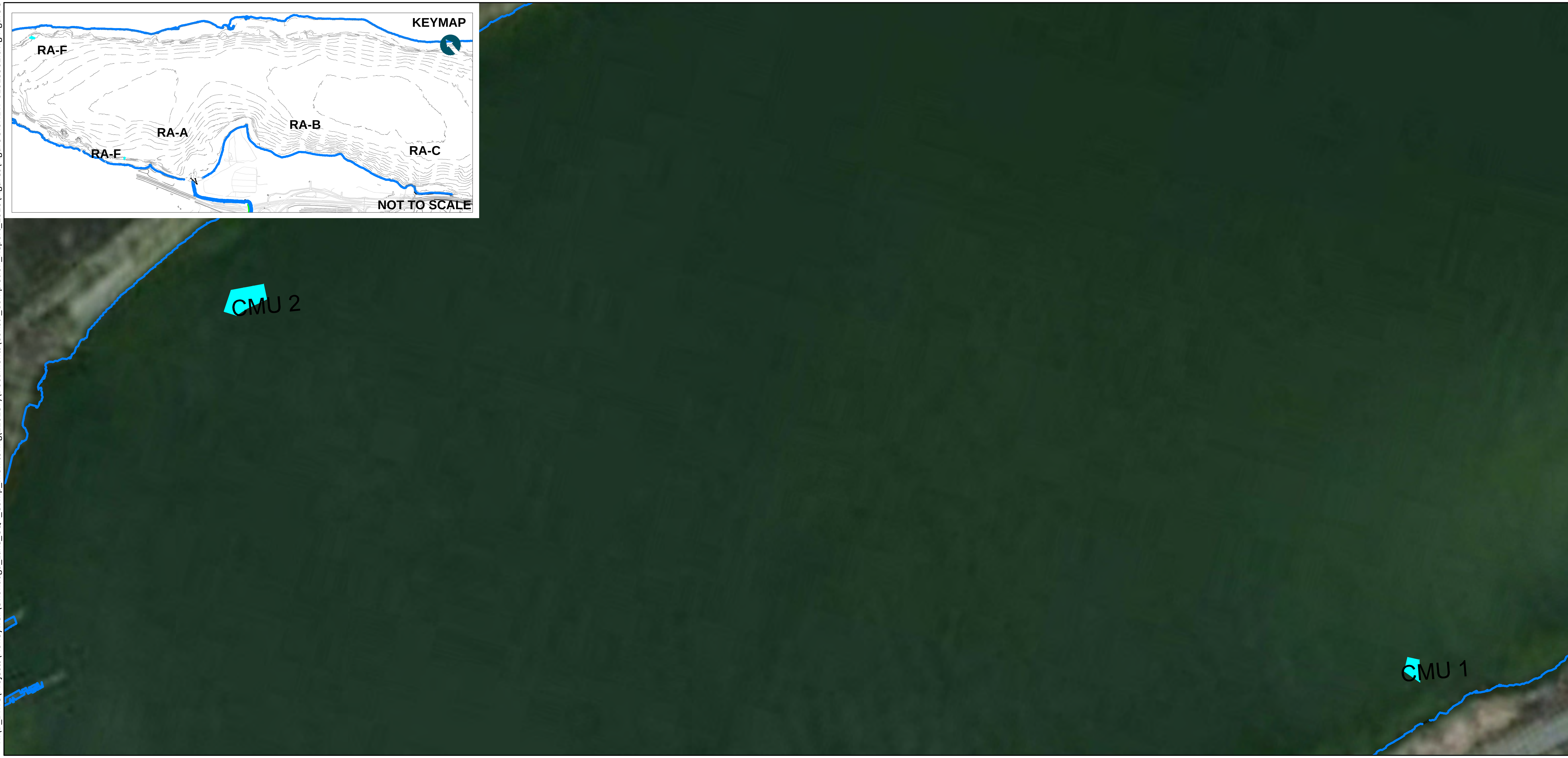
Figure 5-5
Completed CMUs - RA-E
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 5.6NEW-01013902.dwg Figure 5-6

Aug 20, 2017 1:00pm cyard

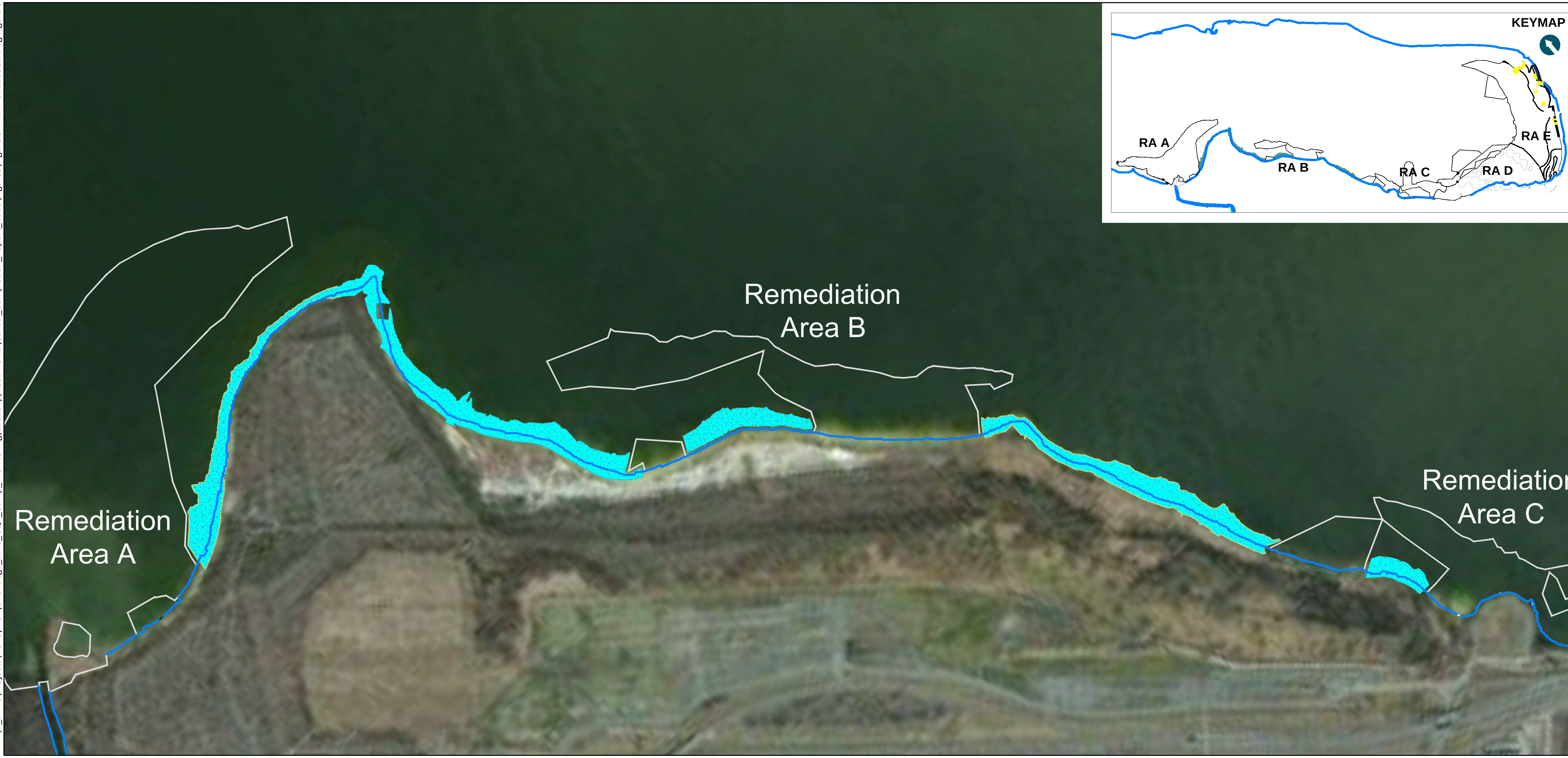
SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:
Shoreline (elev. 362.5')
CMU 10 CMU Boundary
Cap Completed and Approved

0 500
Scale in Feet

Honeywell
ANCHOR QEA

Figure 5-6
Completed CMUs - RA-F
Construction Completion Report
Onondaga Lake Capping and Dredging



H:\D_Drive\Projects\Honeywell\Onondaga_Lake_CQA_Comp_Monitoring(120287)\Documents\Constr_Completion_Report_2016\Figures\Figure 5.7NEW-01013902.dwg Figure 5.7

SOURCE: Aerial Source: Bing Maps
HORIZONTAL DATUM: New York State Plane, Central Zone, North American Datum 1983 (NAD83), U.S. Feet
VERTICAL DATUM: North American Vertical Datum 1988 (NAVD88)

LEGEND:
Shoreline (elev. 362.5')
Remediation Area Boundary
Shoreline Stabilization Complete and Approved

0 600
Scale in Feet

Aug 20, 2017 1:03pm cyard

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Figure 5-7
Completed Cover Placement - Shoreline Stabilization Area
Construction Completion Report
Onondaga Lake Capping and Dredging